JAMAICA

ANNUAL REPORT

OF THE

Department of Science and Agriculture

FOR THE

YEAR ENDED 31ST DECEMBER, 1935.

Ordered by His Excellency the Governor to be Printed.

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DEPARTMENT OF SCIENCE AND AGRICULTURE, JAMAICA.

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	Miss R. E. White.
	Miss M. McDonald.

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Horticulturist	E. Downes.
Assistant	Miss E. G. McKay.

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Technical Assistants	E. K. P. Blake, O. W. Harrison, D.C Davis, W. B. Dixon, Z. A. Daniels, D. A. L. Segre.
Clerk and Storekeeper	L. A. Boothe.

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Entomologist	W. H. Edwards, D.I.C., F.E.S.
Geneticist	L. N. H. Larter, B.Sc., A.R.C.S., A.I.C.T.A.
Supervising Inspector of Plant Diseases	J. B. Sutherland.
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Superintendent of Agriculture	R. S. Martinez, Dip. Agr.
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Agricultural Officer	L. L. Carrington, Dip. Agr.
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	J. M. McEwen, D.I.C.T.A.,
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Technical Assistant	R. C. Bridge
Headmaster Farm School	J. W. Howe, B.S.A., M.Sc.
Assistant Masters	L. A. Powell, H. C. Virtue, V. A. Valentine.
Superintendent Grove Place Stud Farm and Experimental Station	A. F. Thelwell.

Live Stock.

Veterinary Surgeon	S. Lockett, V.M.D.
Technical Assistant	W. F. Hutchinson
Superintendent Hope Stock Farm	J. W. Howe, B.S.A., M.Sc.
Foremen Hope Stock Farm	G. E. Redshaw, R. A. Amiel.
Clerk and Storekeeper, Hope Stock Farm	L. S. Marston.
Superintendent of Stock, Grove Place Stud Farm ..	E. U. Lewis.
Clerk, Grove Place Stud Farm	R. N. Lewis.

DEPARTMENT OF SCIENCE AND AGRICULTURE.

Report for the year ended 31st December, 1935.

SECTION I.—AGRICULTURE IN THE COLONY.

A. GENERAL.

The Director of Agriculture was on duty in the Island from the beginning of the year to the 9th July, when he proceeded on leave. During his absence which extended to the 7th November, Mr. W. L. Barnett, Deputy Island Chemist, acted as Director of Agriculture, while Mr. F. E. V. Smith, Government Microbiologist, took the place of the Director on certain Boards and Committees. Other officers who took leave during the year were:—

Mr. H. H. Croucher, Agricultural Chemist	From 30th April to 4th December.
Mr. L. N. H. Larter, Geneticist ..	From 21st May to 23rd October.
Mr. J. W. Howe, Superintendent Hope Farm and Headmaster Farm School ..	From 16th April to 24th October.
Mr. E. J. Downes, Horticulturist ..	From 25th June to 20th January.

The following Staff changes took place during the year:—

New Appointments:—Miss E. G. McKay was appointed an Assistant in the office of the Superintendent of Public Gardens.

Mr. E. A. Tai, a graduate of the Imperial College of Tropical Agriculture, was appointed an additional Junior Agricultural Officer on the staff of the Low Temperature Station.

Mr. D. A. L. Segre was appointed a Technical Assistant to the Geneticist.

Mr. R. C. Bridge was appointed a Technical Assistant on the staff of the Low Temperature Station.

Mr. W. F. Hutchinson was appointed Technical Assistant to the Government Veterinary Surgeon.

Mr. L. S. Marston was appointed Clerk and Storekeeper, Hope Stock Farm.

Promotions:—Miss E. Marson, Assistant in the office of the Superintendent of Public Gardens, was promoted to a Second Class Clerkship in the Head Office.

2. Departmental activities extended in many directions during the year, while good progress was made with various important lines of investigation. The divisional reports which are now summarised in the general report, give a clear indication of the widespread activities and public services of the Department.

3. The second Staff Conference was held at Hope in January, and again provided a valuable opportunity for discussion of a wide range of departmental problems. The Conference was attended by the Chief Inspector of Produce, the Secretary and Supervisors of the Jamaica Agricultural Society, and the Field, Laboratories, Farm and Headquarters staffs of the Department.

4. The Summer Course of Lectures and Demonstrations was repeated in July, there being a good attendance of the public as well as of the field staffs of the Department and the Agricultural Society.

5. A noteworthy event of the year was the completion of the first twenty-five years establishment of the Hope Farm School. The Graduation ceremony held on the 4th July was attended by His Excellency the Governor, who distributed Diplomas and addressed the pupils. A summary of outstanding events in the history of the school was given by the Director of Agriculture, who made reference, amongst other things, to former Headmasters and to the War records of past students and staff.

6. The programme of investigations of important problems of the banana and citrus industries and the development of minor fruit and vegetable industries was advanced a further stage by the erection and equipment of the Low Temperature and Marketing Station in Kingston. A special function for the

opening was arranged on May 23rd, when His Excellency the Governor attended and after short addresses formerly declared the Station open. The Report of the Microbiologist who is in charge of that division indicates the rapid extension and progress of the work for which the Station is responsible. A noteworthy feature is the marketing investigation of a variety of fruits and vegetables under both experimental and commercial conditions, the results of which are described in detail in the Microbiologist's Report. The demands upon the Station during the year became so heavy that it was necessary, after a few months, to extend the buildings and increase the subordinate staff.

7. The Rust Disease of Pimento which first became evident early in 1934 increased in extent and intensity during 1935. Through the kind offices of Professor J. H. Faull of the Arnold Arboretum, Harvard University, the services of Dr. J. D. MacLachlan, Sheldon Research Fellow of Harvard, were made available for special investigation of this problem in Jamaica. Dr. MacLachlan arrived in the Island in September but his enquiries were not completed by the end of the year. Brief reference is made to this matter in the Microbiologist's Report. It is expected to complete these enquiries and a report of the investigation will be published in 1936.

8. The Director of Agriculture and the Microbiologist became increasingly occupied with matters relating to the welfare of the various Co-perative Marketing Associations. Attendance at various meetings, preparation of special reports, and the conduct of negotiations on behalf of the Government, took up a high proportion of the time of these officers both in Jamaica, and in the case of the Director, in England. It is recognised that the Department must interest itself in problems of marketing as well as in those of production, but the peculiar difficulties of the various marketing associations, involving as they have done the Senior Officers of the Department, have imposed heavy additional duties, which, were it not for the zealous and loyal service of the whole staff and the willing acceptance of additional duties and responsibilities by senior officers, might have affected the general efficiency of the Department.

9. I desire to place on record my recognition of the unstinted service and loyal co-operation of all officers of the Department, which have enabled it to meet succesfully the ever increasing demands made by the Government, various Societies and organizations and members of the general public.

10. The Director of Agriculture attended a meeting of the Advisory Committee of the Central Sugar Cane Breeding Station in Barbados in February, and took the opportunity of visiting Trinidad, where he was a guest of the Principal of The Imperial College of Tropical Agriculture for several days. Valuable opportunities were thus afforded of establishing personal contact with agricultural investigators and work in those two Colonies, as well as of obtaining first hand information regarding the varied activities of the Imperial College of Tropical Agriculture.

11. Approval was given for two officers of the Department (Messrs. J. B. Sutherland and A. F. Thelwell) to visit Trinidad in February. Accommodation was provided for them at the Imperial College of Tropical Agriculture there and the Principal made excellent arrangements for them to see and hear all that was possible during the three weeks stay, in connection with the work of the College and of the Department of Agriculture, while visits were paid to plantations of various kinds in different parts of the Island.

B. PRODUCTION*.

12. The mean rainfall for the whole Island was 71.13 inches,—2.74 inches below the average for 60 years. In the first six months of the year the rainfall was 26% below the average, and in the second six months 12% above the average. The markedly low average rainfall during the first half of the year was indicative of protracted drought in considerable areas, particularly the coastal districts of St. Mary. The total fall for the year was below the ten-year average in all parishes, except in St. Andrew, St. Thomas, Portland and Westmoreland. Severe drought was experienced in St. Ann, St. Elizabeth, St. Catherine as well as in localised areas in Trelawny, Hanover and Clarendon. Two storms accompanied by very heavy rains were experienced in September and October, the districts affected being Hanover and St. James, in the first case, and St. Thomas, Portland and St. Mary in the second. It is estimated that these disturbances caused the loss of approximately four million stems of bananas.

13. Despite less favourable weather conditions than normal the year 1935 was generally prosperous from the agricultural point of view. The value of the exports of the Colony's main agricultural products showed an increase of from £3,023,636 in 1934 to £3,633,944 in 1935.

It should be noted that these and other statistics for export and f.o.b. values are obtained from the Collector General's returns which are compiled from Customs export statements. It should, however, be noted that the actual values thus obtained for exports are often, if not actually always somewhat below the true figures, so that the true value of the Colony's export trade is actually higher than the usual published statements indicate. From data furnished by the three banana exporting organizations, it is computed that the correct f.o.b. value of bananas exported during 1935 is £392,000 higher than the figure disclosed by Customs returns. The Customs figures, however, are exclusively used in this report.

14. But for the storms it is possible that the output of bananas would have been almost a record one As it was a total of 20,379,326 stems, (equivalent to 13,098,330 counts) valued at £2,174,406 were shipped compared with 15,974,906 stems (equivalent to 9,647,773 counts) valued at £1,665,082 in 1934. It is expected that 20 million stems will be available for export in normal circumstances during 1936. In addition to this satisfactory increase in both quantity and value, there was an improvement in grading from 60.4% in 1934 to 64.2% in 1935. The storms caused serious reduction in output during the last three months of the year and exports are not expected to show any close approach to normal before April or May, 1936. The damage to cultivations rendered it necessary for the Government to consider measures of assistance and relief. The Legislative Council approved of loans to cultivators owning less than 50 acres in bananas, who had experienced serious damage, to be made through the Agricultural Loan Societies, and the sum of £25,000 was approved for distribution by the Agricultural Loan Societies Board to Loan Banks to enable the latter to make loans at 6% interest to that class of grower. The Banana Industry Aid Board was re-constituted by Law (Law 24 of 1935) and was authorised to issue loans to a like amount.

*This portion of the Report closely follows Chapter VI—"Production" in the Annual General Report.

15. Panama Disease continued to take its toll and it was found necessary, for economic reasons, to give approval for a wider application of the "one-root" treatment approved for the parish of St. Mary only, in 1934. As a result banana growers are now co-operating with the field staff of the Department of Science and Agriculture to a better extent than ever before in combating this serious menace to the industry. As a general rule growers are required now to carry out the treatment themselves at their own expense, and compensation for healthy plants destroyed has almost disappeared. These steps have led to a considerable reduction in the expenses attached to the administration of the Panama Disease Order, and Inspectors who are now relieved from the duty of treating cases for smaller cultivators are able to cover their districts more rapidly and frequently and to exercise better control over the position than formerly. As well as doing everything possible, with due regard to the economic position of cultivators, to check the spread of Panama Disease, the Department of Agriculture is investigating the development of resistant varieties of banana having the desired commercial characteristics and the fertilizer requirements of the crop in different districts.

16. In order to assist the Government to meet the expenditure on research work connected with the banana industry, the fruit companies and the Jamaica Banana Producers' Association have made contributions totalling £800 per annum for a period of three years, to enable further investigations on the manuring of bananas to be conducted.

17. Shipping trials with the Cavendish or China banana, and with seedling bananas evolved by the Department of Science and Agriculture, were continued during the year and yielded results of interest and value to the industry, which are recorded in published reports. Markets for bananas remained fairly good throughout the year.

18. The affairs of The Jamaica Banana Producers' Association gave cause for anxiety and representations were frequently made with a view to securing greater protection of their supplies which the Association alleged were going to other companies. Early in the year consideration was given to the possibility of enabling the Association to pay outright prices for fruit supplied to them, equivalent to those paid by the other companies, and in December Legislative Council approved of the Association being guaranteed in a sum of £10,000 over a period of six months, and the grant of a moratorium for the year 1936 in respect of certain charges due by the Association under the Law so as to put them in the position to pay market prices to their supplies at the time of delivery of the fruit.

19. It was felt the position of the industry as a whole required the most searching and impartial enquiry, and the Secretary of State was, therefore, requested to select the personnel of a Commission, the members of which arrived in the Island on the 1st January, 1936, and are now engaged upon their investigations.

20. *Sugar.*—The production of sugar again showed a substantial increase over the previous year the total being 76,753 tons as compared with 72,430 tons for 1934. The exports totalled 68,939 tons valued at £558,464, compared with 54,227 tons valued at £448,160 for 1934. It is noteworthy that the substantial increase in the production of sugar is accompanied by an increase in the weight of cane produced by cane farmers and supplied to factories. In 1934, 2,144 farmers supplied 106,541 tons of sugar cane,—the corresponding figures for 1935 being 3,838 farmers and 160,848 tons of cane, an increase of 1,694 farmers and 54,307 tons of cane. The Sugar Control Board and the Advisory Committee on the Sugar Industry continued to function throughout the year. The Sugar Manufacturers' Association again provided a sum of £300 to defray the expenses of a Statistical Clerk attached to the Department of Science and Agriculture for the purpose of compiling crop and factory records which are issued periodically and supplied to all sugar factories. This service has enabled an accurate record of cane, sugar and rum production to be kept in respect of each of the thirty-four factories, which has thus been available for the issue of an annual bulletin dealing with the economics of the industry. Bulletin No. 4 (New Series) issued by the Department of Science and Agriculture gives a survey of the yields of sugar cane in Jamaica for the 1933-34 season. A similar report for the 1934-35 season is now in course of preparation.

21. Increasing interest is evidenced in the Wet Sugar Industry. Prices on the whole have been unattractive during the year.

22. *Rum.*—The exports of Rum were 466,259 gallons valued at £149,998 in 1935,—an increase in quantity of 6,461 gallons and in value of £14,195. The Rum Pool continued to operate with benefit to the industry.

23. *Citrus.*—The exports of grapefruit declined to a marked extent in quantity and value, the recorded figures being 16,736,562 fruits in 1934 valued at £78,370, compared with 8,716,631 fruits in 1935 valued at £47,170. A very high proportion of the Jamaica crop consists of seeded varieties which are, for practical purposes, unmarketable abroad after the beginning of December. The possibility of processing a portion of the crop and selling it in the form of canned fruit, juice, and juice powder, is now being investigated. Despite the disappointing market returns of 1935 for grapefruit, there is confidence in the future although keen competition is experienced in our markets from other countries.

24. The export of oranges showed a remarkable increase from 78,555 boxes in 1934 valued at £32,572 to 143,597 boxes in 1935 valued at £56,625, thus compensating in a large measure for the decline in value of grapefruit exports. This increase was largely due to the New Zealand market which took 32,240 boxes of oranges during the calendar year 1935. In order to avoid over-supplying that market it has been found desirable to introduce measures under The Agricultural Produce Law 1926, to control quantities shipped from Jamaica. The Regulations made under the Law have worked smoothly during the present season. It is satisfactory to know that Jamaican oranges are highly regarded in the New Zealand market and that official reports on the conditions of consignments on arrival have been good.

25. The Government has continued the Citrus Development programme first commenced in 1933, and during the year 40,028 plants of standard marketable varieties were distributed by the two large Government nurseries and planted out under the supervision of officers of the Agricultural Department. The Legislative Council gave approval in May, 1935, to a scheme for providing loans to planters who desired to establish substantial areas in citrus, and effect was given to the scheme by a Law passed during the Autumn Session. Under that portion of the programme assistance had been rendered for the planting of 122 acres up to the end of 1935.

26. The Jamaica Citrus Producers' Association continued to operate during the year and the lease of the Packing House owned by the Government was conditionally extended to the Association up to the 25th May, 1936. It is understood that contractors have not loyally supported the Association during the year with a result that it has had to purchase fruit in the open market in order to continue in business and to maintain its brands in the markets.

27. *Orange Oil.*—Exports of Orange Oil declined in quantity from 5,030 gallons in 1934 to 3,564 gallons in 1935, but the values were practically the same, being £7,397 in 1934 and 7,387 in 1935.

28. *Pimento.*—The pimento crop declined seriously in production and the exports fell from 12,150,678 lbs. in 1934 to 8,047,863 lbs. in 1935, the values being £96,348 in 1934 and £80,725 in 1935. The overseas demand for pimento fell off and growers and merchants were experiencing difficulty in disposing of the crops.

29. *Honey.*—Exports of Honey increased from 1,623,214 lbs. in 1934 to 1,872,400 lbs. in 1935, but declined in value from £16,360 to £13,585.

30. The Beekeeping Industry continued to be menaced by an outbreak of Foul Brood Disease which first made its appearance in the Kingston district during the latter part of 1934. The failure on the part of owners of infected apiaries to adopt effective methods for the reduction of the disease rendered it necessary to exercise compulsion under The Protection from Disease (Bees) Law.

31. *Coconuts and Copra.*—There was a slight fall in the value of Coconuts exported, though quantities showed a small increase, the figures being 37,144,647 nuts exported in 1934 valued at £96,746 and 37,256,680 nuts in 1935 valued at £91,187. The coconut industry in general appears to be in a healthy condition and the number of factories established to manufacture coconut products for sale in the Island has increased. The manufacture and sale locally of laundry soap having coconut oil as its principal ingredient, continues to develop and to be reflected in Customs returns for imports of soap which are now considerably lower than formerly.

32. The outbreak of Bud Rot disease has not yet been entirely suppressed in St. James and Hanover but the control campaign is continuing. Trees in St. Mary reported to be suffering from a disease in 1934, officially attributed to be the physiological result of adverse weather conditions, have now recovered.

33. It is remarkable that exports of Copra remained practically negligible, showing that the coconuts surplus to the requirements of the whole nut market are rapidly disposed of locally in various forms, including oil, meal, and soap.

34. *Ginger.*—Dry Ginger exports increased from 2,394,699 lbs. in 1934 valued at £64,579 to 2,879,017 lbs. valued at £69,938.

35. *Cocoa and Coffee.*—Cocoa also increased despite the continuance of low and rather unattractive prices, while Coffee, though increasing in quantity from 7,132,563 lbs. to 7,593,697 lbs. decreased in value from £168,091 to £155,452. Some concern is felt at the position of the coffee industry which must place itself in a position to meet the increased competition in the markets by other countries where production is highly organised and where the greatest care is exercised in the processing of the crop. The highly attractive prices for Blue Mountain coffee in 1934 appear to have led to the export of grades of coffee under that name, which, while coming from some of the higher areas, were not true Blue Mountain coffee.

36. *Logwood and Logwood Extracts.*—Logwood and Logwood extracts both showed considerable increases in quantity and value of exports in 1935, compared with 1934, while the value and exports of Bitterwood, Quassia chips and Fustic declined somewhat.

37. *Cattle and Beef Industries.*—The total number of cattle slaughtered for human consumption during 1935, as disclosed by official returns, was 34,583, compared with 32,559 in 1934. There was also an increase in the exports of Hides which amounted to 20,405 valued at £9,458 in 1935, compared with 19,826 valued at £9,158 in 1934. Goatskins were exported to the number of 189,427 valued at £14,398 compared with 180,152 valued at £13,121 in 1934.

38. The general position of the Beef Cattle Industry continued to give cause for concern, owing to a surplus of animals available for slaughter and a continuance of low prices. The increased use of mechanical tillage and haulage on sugar estates is, to some extent, responsible for this situation. A Committee appointed in 1934 to investigate and make recommendations in regard to the Beef Cattle Industry in Jamaica reported in June 1935. Action is being taken on the report to investigate the possibility of encouraging greater consumption of fresh beef, and the better regulation of the conditions under which butchering is carried on. The contemplated erection of a modern slaughter house in Kingston should tend considerably to improve the position.

39. A Committee also reported in July on the Dairy Industry and made recommendations for the encouragement of the manufacture of butter for local consumption.

40. There were two outbreaks of Anthrax in 1935 and two recurrent outbreaks registered of Texas Fever. No survey work on Tuberculosis in cattle was possible during the year. There are a number of obscure diseases of stock in Jamaica which need investigation. No research work has yet been undertaken on the blood parasites of animals nor on internal parasites such as liver flukes in cattle, sheep, and goats. Piroplasmosis (Texas Fever) has been known to exist for some time in Jamaica, but only recently was Anaplasmosis recognised.

41. Importations of stud animals in 1935 include: 4 Bulls, 1 Suffolk Ram and 5 Suffolk Ewes; 1 Anglo-Nubian Goat and 2 does; and 1 Duroc-Jersey boar. Exports included 150 pack mules to the Republic of Panama.

42. *Low Temperature and Marketing Experiment Station.*—The Low Temperature and Marketing Experiment Station was opened in May, 1935 for the purpose of dealing with refrigeration and transport problems connected with the export of bananas and citrus fruit, and of exploring the possibilities of export trade development in minor fruits and vegetables. Experimental plots were also instituted in connection with this Station for the trial of a wide variety of vegetables and other potential exportable products.

43. From the time of its establishment to the end of the year the Experiment Station exported some 3,500 packages, covering in all 49 different shipments. Of these the majority were sent to Covent Garden, London, but trial shipments were also sent to Canada and Curacao. Satisfactory results were obtained

with shipments of eggplants, sweet peppers, mangoes, limes, new potatoes, beans, vegetable marrows and carrots, all of which showed profitable returns, and in all these cases there appears to be ample possibility of development.

44. *Hope Farm School.*—The Hope Farm School completed its first 25 years and fitting reference was made to the Jubilee of the Institution by His Excellency the Governor on Graduation Day which was held on July 4, 1935. At the end of the year there were 46 students in residence. The training given at the school is carefully planned in regard to the agricultural requirements of the Island and the improvements resulting from the re-organisation of the school in 1931 have been maintained and extended. The school is attracting a good type of youth and little difficulty is now experienced in securing employment for those who have completed the Course.

45. *General.*—Speaking generally, the agricultural prospects (in so far as production is concerned) for 1936 are good. The output of bananas, given satisfactory weather conditions, is expected to reach 20 million stems, while a substantial increase of some 10,000 tons is estimated for the sugar crop. The new Caymanas Factory, now almost completed, is expected to commence grinding in March, 1936, or shortly afterwards. The citrus crop gives promise of further increase, a satisfactory feature being the greater quantities of seedless grapefruit likely to be available for export as a result of the planting programme of the past few years. The production of coconuts, also, is estimated to be greater in 1936 and exports of nuts are likely to increase if market prices are sufficiently attractive. The increased consumption of beef is likely to lead to increase exports of hides, which, as already mentioned, showed a substantial increase during last year over 1934.

46. The demand for Lime Juice, the exports of which almost doubled in 1935, is expected to be well maintained and the demand for certain essential oils to increase.

47. Though no great improvement in general commodity prices can be foreseen for the year, there appears to be a prospect of the maintenance, if not the actual increase in market values of Copra which have, during recent months, shown a tendency to rise. It may, therefore, again be possible to export copra profitably.

48. Enquiries have shown that a good demand now exists for cigar leaf tobacco of Empire origin, and Jamaica has an opportunity of entering the market which should provide yet another substantial agricultural activity for its people.

49. Jamaica is exceptionally fortunate in having a climate and soil which enable a wide range of products to be profitably grown, and to have at the same time markets in which those commodities have hitherto found a ready and profitable sale. It is, however, becoming more evident that increased competition by other countries demands the exercise of greater care and trouble to improve standards of quality and to supply the grades and varieties of different kinds of produce which are most readily acceptable in the markets. The banana, the sugar and rum, and possibly the coconut industries, are well organized, but citrus, coffee, and tobacco, among others, call for special and early attention.

C. SUMMARIES OF DIVISIONAL REPORTS.

50. The following summaries of divisional reports have been prepared for inclusion in this section of the Departmental Report by the officers concerned:—

Summary of Report of the Superintendent of Public Gardens and the Horticulturist.

51. The Public Gardens were satisfactorily maintained. The Orchid collection was increased by the introduction of 100 *Cattleya Trianae* and other orchid plants. A new feature in the Hope Gardens was the arrangement of Gladioli and Petunias together in beds which gave a pleasing display and attracted attention. Further progress was made in the establishment of the Arboretum along the main entrance drive. The public much appreciated the two Band Concerts which were held in the Hope Gardens.

52. The rainfall at Castleton was much above the average. Slight damage was done by the wind when a hurricane passed to the north of the Island during the latter part of October. The mangosteen crop was a large one this year.

53. The work on the Parade Court House Site was completed during the year. The Jamaica Military Band played in the Gardens twice a month.

54. Two old plots of Assam Jart Tea at Cinchona were cleared of forest growth and pruned with the object of testing out the leaves for the making of tea. General repairs were done to the buildings and water tanks. A new tennis court was laid out at King's House and will be completed early in 1936. A seedling House was erected for raising seedlings. *Cassia grandis* trees were planted by Their Royal Highnesses the Duke and Duches of Kent and the Duke of Gloucester.

55. A Talipot Palm flowered at Bath Gardens during the year.

M. S. Goodman,
Superintendent of Public Gardens.

E. J. Downes,
Horticulturist.

Summary of Report of Superintendent, Experiment Station, Hope.

56. The general routine work was attended to and a tidy appearance was maintained. The rainfall was normal and there were no flood rains experienced to do damage to the fields and roads. Distributions of cane varieties to large and small cane farmers were made free of cost. The number of cuttings distributed was slightly below that of last year. Mosaic Disease resistant varieties were distributed in larger quantities. The introduction of the two new varieties Mayaguez 28 and Fajardo Central 916 has been pleasing to the planters and they are much sought after for trial on estates. The Uba cane is no longer used as a resistant variety in the control of Mosaic Disease.

57. The results of the Tomato experiments have clearly demonstrated the risk of growing this vegetable on a large area on the Liguanea Plains for export. The Eggplant appears to be worthy of extension. There are few insect pests and diseases which attack this plant and do any appreciable damage. Peppers are also promising but precaution must be taken to destroy all relative plants which are infected with mosaic in the field or adjoining. Eight new varieties of Sweet Potatoes were introduced and cuttings are now available for distribution. Results of trials in the Station proved the advisability of growing cover or green manure crops through citrus in dry areas.

M. S. Goodman,
Superintendent.

Summary of Report of the Superintendent of Sugar-cane Experiments.

58. Although the weather conditions during the reaping season were considered good, it was so dry in some districts that both the old and the young canes suffered. This will not affect the crop to be reaped in 1936 as some districts did not suffer from this severe drought and they are looking forward to producing more sugar than in 1935.

59. It is satisfactory to note that planters have confidence in the advice given by the Department and any new varietiesintroduced are readily sought after for trial with their other varieties. All assistance required for the laying down and reaping of experiments is readily given by the Overseers on the Estates concerned. There is already marked improvement in the results of the factories since chemical control has been introduced. As most of the factories are too small to have their own chemist a number of these factories join together and employ one chemist among them. A main laboratory is on one estate but the chemist has assistants at each factory who look after taking samples, etc. during his absence, and he visits each factory when possible daily or bi-weekly.

60. Diseases and Insect Pests of cane have been not much in evidence this year. There is no disease except Mosaic which is of any worry to the planters or occasions any loss. Now that there is a Plant Quarantine Station in Trinidad, under the control of the Professors of the College of Tropical Agriculture, planters can be assured that there is no risk of importing new diseases in varieties introduced through this station.

M. S. Goodman,
Superintendent of Sugar-Cane Experiments.

Summary of Report of the Government Entomologist.

61. *General Remarks:*—No destructive outbreak of insect pests has occurred during the year. Increased interest taken by planters in the control of insect pests has been evidenced not only by greater volume of advisory work by correspondence and by personal visits at the Laboratory and in the fields but also by frequent requests from planters that lectures and demonstrations be given to them. Outbreak of a new pest *Taeniothrips gladioli* has to be deplored. The introduction of the pest has taken place in spite of measures taken to strengthen protection against accidental introduction of insects on imported plants. The eradication of this pest remains problematic as it may have been disseminated on cut flowers before its presence was discovered.

62. *Banana:*—The economic status of the Borer has remained unchanged since last year. On account of hurricanes its control has again had a set back. More planters, however, have been giving attention to field sanitation. The investigations persistently carried out with regards to the biology of the pest have revealed that it is destroyed in large numbers by the Giant Central American Toad, *Bufo marinus*. The importance of this predator with regards to *Cosmopolites sordidus* is very great but its presence in our cane fields will have to receive special consideration in connection with the project of introducng insect predators as unless those belong to groups of insects as would escape from the voracity of the toads they might be exterminated as soon as released. Special attention has been given to the possibility of Banana being attacked by nematodes; investigations carried out to date indicate that this fortunately is not the case.

63. *Sugar Cane:*—Sporadic outbreak of Leaf Hoppers of small economic significance have occurred. Statistical investigations re nodal infestation by *Diatraea saccharalis* amongst the seedlings grown in the Experiment Station have shown a maximum of 22.6% nodal infestation among the CO 213.

64. *Coconuts:*—Scale insects mentioned in previous reports have almost disappeared. Restricted infestations of *Xyleborus perforans* and of *Strategus titanus* have occurred where many trees have died from Bud Rot or from the effects of hurricanes. Experiments carried out in collaboration with the Soil Chemist are in course. The question with regards to the coconut industry in the Cayman Islands having already been dealt with in detail in a separate report, the remarks made therein are not repeated here.

65. *Coffee:—Coccus viridis* has frequently been very destructive. The more frequent mode of dissemination of the pest is explained and the need for coffee nurseries emphasised.

66. *Citrus:*—There has been, during this year, a relative absence of scale insects, though planters in very many cases have been giving more attention to the control of those pests. The possible necessity of compulsory spraying is pointed out.

67. *Progress in Applied Entomology:*—Effect of departmental policy on work of entomological division is explained.

68. *The West Indian Fruit Fly.*—Results of investigation are submitted; they show that measures of sanitation by destruction of all infested fruits as usually stressed elsewhere and also in Jamaica in the past can have no economic significance.

69. *Nematodes.*—Results of investigations carried out during the year explained and danger of susceptible cover crops pointed out.

70. *Miscellaneous.*—Attendance at meetings of planters, Lectures delivered, etc. Miscellaneous matters of no entomological interest but which, unfortunately, take time but have to be done are merely mentioned. Increase of work in the entomological division creates necessity for increase of equipment and staff if demands continue to increase at the same rate as in the recent past.

W. H. Edwards,
Government Entomologist.

Summary of Report of the Government Geneticist.

71. *General:*—Winds of September-October resulted in loss of 24% of bunches pollinated and set back breeding towards the end of the year. General weather conditions were not quite so favourable for setting of seed as in 1934. Appointment of a technical assistant on May 7th had greatly expedited laboratory investigations. Erection of a greenhouse at Hope, completed on February 25th has resulted in considerable increase in germination percentage and reduction in mortality among young seedlings.

72. *Breeding:*—Extension of the breeding station at Castleton by $\frac{3}{4}$ acre has been made, and 1 acre breeding plots are being established at Potosi (St. Thomas) and Gibbs Hill (St. Mary). Seedlings are being raised from the crosses, Gros Michel x Musa acuminata, Gros Michel x Fl (S.7, 17, 19 etc.) and Fl x Fl. 1957 stems pollinated equivalent to an increase of 3% over last year. Resulting increase in seed production was 38%, and in seed germination approximately 250%.

253 seedlings have been produced in 1935 of which 87 are already established in the field. Seedlings from the cross Highgate x M. acuminata, though still young, show considerable promise as regards strength of leaf and general growth habit.

73. Cytological work closely follows up seedling production, chromosome counts of 78 having already been made. Considerable progress has been made in the elucidation of cytological processes controlling fertility and seed production and in consequence the possibilities inherent in several of the crosses in progress can now be gauged with some degree of accuracy.

74. Seedling variety trials have been continued more or less unchanged from 1934, mainly with a view to providing fruit for experimental shipment (see Report Low Temperature and Marketing Station). It is concluded that further ratooning and cultural methods are not likely to give significant increase in size and grade of S7, 17, 19 etc. and that first ratoons of future seedlings will provide a reliable indication of commercial possibilities in normal seasons. Seedling varieties exhibit a high degree of immunity to Panama Disease, only 3 of 46 varieties tested have contracted disease. An experiment, at present incomplete, to test reaction of Highgate variety to P. D. indicates that that variety cannot be regarded as resistant for commercial purposes.

75. *Papaw,*—Search for a variety of Papaw (*Carica papaya*) resistant to mosaic is being continued. Of 32 varieties so far tested only one shows any signs of resistance and test of that is so far incomplete.

L. N. H. Larter,
Geneticist.

Summary of Report of the Headmaster Government Farm School.

76. The School completed a very successful year with an average of 44 students in attendance. This number was the same as last year. The School passed a milestone in its history in celebrating the twenty-fifth anniversary of its operation. On July 4th, 14 students were graduated with Diplomas in Practical Agriculture and I am pleased to report that a number of the graduates have already found employment. The usual curriculum as outlined in the Prospectus was carried out with the exception that Surveying was changed from the Third Year and is now a Second Year subject.

77. During the year the students made a number of tours in the country both while they were at Hope and while they were at Grove Place. The pratical information obtained from such tours is great. The Experiment Station at the Farm School was well established during the year and experiments in nearly all the crops grown in Jamaica were carried out. The School had an exhibit at the May Pen Show in April, at which time information along the lines of the work being done here was given by Members of the Staff who were present. A number of meetings were held at the School during the year and several tour parties from the country inspected the School.

78. The health of the students during the year was good. A successful Sports Day was held in March. A team was entered from the School in the Third Division Football League and a team was also entered in the Evelyn Cup Cricket Competition.

79. During the year the Headmaster was away from the Island on Vacation Leave from April 14th to October 25th.

J. W. Howe,
Headmaster.

Summary of Report of The Farm Superintendent.

80. The year under review was on the whole not a good one for livestock due to low rainfall, combined with a very uneven distribution. The rainy season ended much earlier than in years previous which made the effect of the drought felt earlier than in former years. The number of livestock on the Hope Farm showed an increase of 36 head while the value showed a decrease of £486 17s. 0d. The calvings for 1935 showed a slight increase over the previous year while the deaths showed an increase of one over the previous year. No serious outbreak of disease was reported in the herd with the exception of Tuberculosis. As the result of two tests taken in July and September, 26 animals reacted.

81. There were no importations of livestock for the Farm, but an Aberdeen Angus bull which was imported for Grove Place was landed at the Stock Farm and is being kept until it becomes acclimatized. There was only one purchase of livestock made during the year that being a gelding, Sir Gerald, for riding purposes on the Farm. The sales of livestock compared favourably with the previous year and while the demand for bull calves was only fair, the Farm was able to sell most of the animals offered.

82. The milk yield reached a record production for the year of 267,429.75 quarts—an increase of nearly 13,000 quarts over 1934. The milk sales also showed a similar increase. The average production per cow showed a slight increase over the previous year, as well as did the herd average. The amount of butter made decreased slightly over 1934 due to the increase in the requisitions for milk.

83. The public stud service established in 1934 was fairly well patronized, a total of 58 cows being sent to the bulls standing for service.

84. The poultry on the Farm did well during the year and there was a keen demand for breeding stock from the flock.

85. During the year what is thought to be a West Indies record for individual production for a cow was made with the cow Nancy, which produced between December 2, 1934, and December 31, 1935, a total of 11,199.6 lbs. of milk. This cow reached a maximum of 75.8 lbs. of milk or 29.2 quarts in one day.

86. The guinea corn crop was definitely inferior both in tonnage and quality to the previous year, but the sugar cane and mango crops on the Farm were well up to the average. A feed storage room, and a cottage for the Livestock Foreman, were erected during the year, and the old Feed Storage room converted into a store room for tools and equipment.

87. At the end of the year the Farm records were transferred from the Head Office, to the Office of the Farm Superintendent and now all work in connection with livestock records is handled at this office. The Stock Farm exhibited a number of head of livestock and various stock foods at the May Pen Show on April 22nd.

88. The Farm Superintendent was away from the Island on Vacation Leave from April 14th to October 25th.

J. W. Howe,
Farm Superintendent.

Summary of Report of the Superintendent Government Stud Farm and Experimental Station.

89. *Weather.*—Weather conditions at Grove Place, though ideal from the point of view of rainfall—there having been 107 rain days with a precipitation of 89.11 inches for the year—were offset by a storm on the 27th September, which damaged the crops on the Experimental Station.

90. *Experimental Station:*—In addition to the upkeep and extension of established major crops, cultivation of root and catch crops for purposes of Agricultural Education were undertaken, and projects for composting manure, fertilizing pastures and studying Green Manures were initiated and carried through. Extensions were made to provide for Bitter Damsel and Coffee nurseries, eight acres of Orange and a sixteen-acre plot for experimentation in manuring Grapefruit. Trials of new fodder crops —Alfalfa and Egyptian Clover—were undertaken, while plots of Vegetables were grown for the Low Temperature Station. A further series of experiments comprising varietal test, cultivation and manuring of Potatoes were undertaken on behalf of the Jamaica Agricultural Society.

91. *Livestock:*—Stud services for horsekind, cattle, sheep and pigs were fully maintained throughout the year, with fair public patronage. The death of 17 heifers from a disease which at first remained unidentified, but was subsequently brought under control, proved a set-back to the work of grading up dairy cattle, while, as a result of these deaths and the low price of livestock, the valuation figures for 1935 are less than those for the previous five-year average.

92. *Agricultural Education:*—Senior students from the Farm School at Hope attended for a course of instruction in practical agriculture, the course extending over three periods of six weeks each. Twelve Demonstration Days for branches of the Jamaica Agricultural Society and Schools, and one Island-wide Citrus Field Day were observed.

93. *Improvements, etc.*—General improvement of the Farm, embracing repairs to walls and fences and the bringing of back lands into pasture condition, has been effected, while a new building for accommodation of Assistants was erected and one tank repaired.

94. *Staff.*—The staff has been strengthened by the appointment of two Agricultural Assistants. The Superintendent was absent on an official visit to the Imperial College of Tropical Agriculture, Trinidad, and in addition to his normal duties, was engaged as Secretary to the Commission on the Lands and Survey Department and in the inspection of properties proposed for Land Settlement.

Arthur Thelwell,
Superintendent.

Summary of the Report of the Deputy Island Chemist.

95. Total No. of Samples analysed:—		
For the Police Department		1,844
Customs and Excise Department		482
Dept. of Science and Agriculture		25
Island Medical Department		27
Public Works Department		159
Kingston and St. Andrew Corporation		7
Water and Sewerage Board		1
The Jamaica Agricultural Society		3
Total Official Samples		2,548
Government Stock Farm (Milks)		1,025
General Samples, Cattle Dips		59
Sugars		75
Rums		66
Miscellaneous		122
Total General Samples		1,347
Grand Total of Samples analysed		3,895
No. of Exhibits analysed:—		
Human Viscera and Organs for Poison		164
Animal Viscera (cows)		2
Under the Coinage Laws:—		
Counterfeit Coins and Coining Exhibits		586
Under the Dangerous Drugs Law.		
Opium Exhibits 96, Ganga Exhibits 609		705
Under the Spirit License Law.		
Rums, Whisky, Gin, Spirits, etc.		51
Under the Medical Laws.		
Medicines, etc.		55
Under the Petroleum Laws.		
Kerosines		6
In connection with:—		
Murder Cases		34
Cases of Obeah		4
Cases of Criminal Abortion		18
Cases of Arson		21
Miscellaneous cases		20
Amount collected for Laboratory Fees		£143 9 0
Amount collected for Laboratory Sales		£996 6 1
Laboratory Staff:—Deputy Island Chemist		1
Assistant to D.I.C.		1
Technical Assistants		2
Clerk and Storekeeper		1
Apprentices		3
Total		8

Summary of Report of Government Veterinary Surgeon.

96. Weather conditions in relation to grazing in 1935 were not as favourable for livestock as 1934. The sales and prices of local meats and dairy products continued below normal, and, as may be seen from the Trade Report of the Colony, importations of these articles from foreign countries still furnish the Island with about one-third (estimated value) of the meat and meat products consumed, and approximately five-sixths (estimated value) of its consumption of dairy products and substitutes.

97. The Beef and Dairy Committees appointed by the Government in 1934 to investigate these two branches of the livestock industry submitted their reports in June and July and their recommendations are now under consideration.

98. Importations of stud animals, always very limited in number, were slightly less than in previous years, but the business in baby chicks by aeroplane from United States of America, commenced experimentally in 1932, has steadily increased year by year.

99. The small export of livestock from Jamaica consisted of two stallions, two jacks, eleven Red Poll Cattle, three Mysore bulls and one hundred and fifty mules. Although some attempts have been made to find a foreign outlet for livestock, it is felt that the possiblities have not been fully explored. Jamaica-bred animals are admirably adapted to the conditions existing in other West Indian Islands and the countries of Central America and northern South America.

100. Field work in the control of infectious animal diseases was steadily maintained throughout the year. With respect to these diseases the general health of the livestock has been good.

Sporadic outbreaks of acute Texas Fever are not infrequent, and in the case of two occurrences reported to the Department the mortality was high in spite of attempted field treatment of accutely affected

subjects. As the incidence of this disease, especially in its acute and fatal form, is intimately connected with tick control by dipping operations, the whole problem stands in need of further consideration and direction.

No general plan for ascertaining the incidence of bovine tuberculosis or dealing with it in affected herds has yet been formulated. Discussions have been held with the Island Medical Service, especially with regard to its effect on public health in dairy herds, and plans are being formulated to deal with the problem under The Contagious Diseases Animals (Inland) Law in collaboration with The Public Health Law.

Figures so far obtained indicate that the incidence of the disease in some large herds and in certain localities is high, whilst large and numerous herds in many sections of the Island have shown no evidence of infection.

Much of the unthrifty condition and lack of proper development of the livestock appears assignable to various forms of internal parasites and in this respect poultry are also involved.

Mange (psoroptic) of mane stock is very prevalent and lice in certain districts infest goats very generally although remedial measures are so easy of application.

The year closed with 376 dipping tanks registered in the Department and the sales of Paranaph and Arsenite of Soda for dipping purposes was in excess of 1934. As tick control is so essential for the welfare of the livestock, and increasing laxity in complying with the Regulations dealing with the matter is evident, plans are being made to stimulate and supervise this branch of the work more constantly and systematically.

101. Poultry keeping is constantly faced with many difficulties, such as high cost of feed, depredation by mongoose and rats and night raids of roosts by thieves as well as three serious diseases—contagious epithelioma (locally "yaws"), Fowl cholera, roup—as well as lice and internal parasites.

102. *Government Farm School.*—Regular lectures and demonstrations in veterinary science were conducted in Government Farm School at Hope as in previous years.

103. *Government Stock Farm at Hope.*—Weather and rainfall at the Stock Farm were good for grazing and general animal health. The rainfall was well distributed and the grazing above the average.

The health of the horses and mules of the Farm and Hope Gardens was good, except for injuries and minor ailments associated with their work. One mule died from torsion of the mesentery.

The major problems in the dairy herd at the Farm are tuberculosis, infectious abortion, tick fever, and pneumo-enteric troubles of the young pail-reared calves.

Tuberculin tests have been systematically conducted since the inception of the Farm in 1910 with the results, as tabulated since 1927. The incidence of abortions in the herd has declined since 1933.

Tick Fever (Piroplasmosis) was effectively held in check during the year. Regular dipping was maintained and bad weather (frequent and heavy rains) did not so seriously interfere with its efficacy as a tick suppressive measure as in the excessively rainy years of 1933 and 34.

The percentage of deaths among the pail-reared calved from pneumo-enteric troubles was very small (7 of 158 full-time births).

The poultry at the Farm like flocks elsewhere suffered from contagious epithelioma ("yaws") and fowl cholera. The loss from the first was small as the infection was of mild type. The ravages of the second (fowl cholera) were checked by vaccination.

104. *Stud Farm at Grove Place.*—Weather conditions generally were good for the livestock. Mange (psoroptic) at the Farm among the horses was kept well in hand by the systematic use of lime-sulphur wash.

The cattle continued free of tuberculosis as may be seen by record of the tests made from 1924-35.

The young cattle were vaccinated against "blackleg" as in previous years, because deaths from this disease have occurred in the past.

Between March 11th and August 9th eleven adult cows died with post mortem findings of impaction of the 3rd stomach and general intestinal stasis. Suspicion of possible anthrax infection was allayed because of the negative bacteriological findings made in connection with the matter. On September 18th-19th a field autopsy diagnosis of anthrax was established and the entire herd thereafter was promptly vaccinated and the mortality ceased.

105. *Government Institutions.*—Veterinary services in the Public Works Department consisted mainly of a tour with the Department's Mule Purchasing Committee in October and thirty-seven visits to various stations for inspections and treatment of animals.

Veterinary assistance was rendered to the sheep at the Lunatic Asylum, the mules of the Prison's Department and the General Post Office in connection with their mail contract service.

106. *Agricultural Education.*—Lectures and demonstrations were given at the annual Staff Conference (January 14-15) on certain features of tuberculin testing and diseases of bees.

In the Summer Course in Agriculture (July 22-27) lectures were given on animal breeding and selection and the infectious brood diseases of bees; and at Lacovia, St. Elizabeth, the Associated Branches of the Jamaica Agricultural Society of that area were addressed on "Animal Husbandry in Relation to Agriculture" and on Beekeepers' Day (December 19th) at Hylroy Apiary the Government policy *re* the control of foul brood of bees was discussed.

A short article on "The Care and Management of Jacks" and a lengthy article on "American Foul Brood Disease of Bees" were contributed to the Journal of the Jamaica Agricultural Society for their January and June-July numbers.

107. *American Foul Brood of Bees.*—Field work in the suppression of the third occurrence (official date November 13, 1934) of American Foul Brood of Bees in Kingston and St. Andrew was maintained throughout the year. Infection has remained confined to Kingston and Lower St. Andrew, in which area only 13 of 126 registered apiaries have shown infection.

Registration of apiaries under the Law showed at the end of the year 97 apiarists with 126 apiaries in Kingston and St. Andrew, and 157 apiarists with 292 apiaries in the other parishes. As the registration is by no means complete it is estimated that the total figures so far obtained for the whole Island represent probably a half of the apiarists and two-thirds of the apiaries.

The Flower Garden, King's House.

A Glade in Hope Gardens.

In compliance with Orders under the Law all infected colonies during the year in 12 of the 13 infected apiaries, were burnt, and in most cases this drastic procedure has eliminated recurrent infection in the apiaries.

In spite of difficulties, non-co-operation and some opposition the spread of infection has been checked and there are prospects that the disease may possibly be eradicated.

S. Lockett,
Senior Vet. Officer.

SECTION II.—WORK OF THE DEPARTMENT OF AGRICULTURE.

A.—Public Gardens.

(i) *Report of the Superintendent and the Horticulturist.*

1. Hope Gardens.

On June 25th the Horticulturist proceeded to England on six months leave which did not expire until after the end of the year under review.

Weather.—During the latter parts of September and October two hurricanes passed, one to the south and west and the other to the east and north of the Island, but no damage was done in the Gardens. The rainfall for the year in the Garden was 53.75 inches. This was slightly above the average for the past 54 years.

Orchids.—Approximately 100 plants of Cattleya Trianae and other species of orchids were received from Mr. Rausch, Colombia, in exchange for a collection of Orchids from the Hope collection. With the addition of these winter flowering Cattleyas the orchid collection will provide a better show of blooms for the Orchid House during the Tourist season.

Orchid Seedlings.—Satisfactory growth has been maintained among the seedlings of Cattleyas, Laeliocattleyas, Brassocattleyas and Phalaenopsis which were germinated by the asymbiotic method during 1931.

Gladioli.—Very satisfactory results were obtained with the imported bulbs of Gladioli from Telkamp's, London. The bulbs were planted through the beds of Petunias along the Main Drive early in January and by the end of March there was a pleasing display of blooms intermixed with multi-coloured Petunias. The planting of these two subjects together demonstrated a practice in plant arrangement which had not been seen in the Gardens before.

Bougainvillea "Evelyn Jelf."—By special request of Sir Arthur Jelf, C.M.G. 12 plants of Bougainvillea "Evelyn Jelf" were supplied from Hope Gardens and planted at Vale Royal, the official residence of the Colonial Secretary. Bougainvillea "Evelyn Jelf" is a hybrid variety raised at Hope by crossing B. Rosa Catalina with B. Ruby.

Triplaris americana.—Four trees of *Triplaris americana* flowered for the first time in the Gardens. The flowers are red and more attractive than *Triplaris surinamensis*, but the size of the flowers is much smaller than the last named species.

Aleurites montana.—The two plants set out in the Nursery in 1932 made but little growth during this year.

Seedling Dahlias.—Dahlia seeds were imported from Sutton's, Reading, England, for trial in the Gardens. The seed was sown early in January and the young seedlings transplanted into nursery beds in February and by the third week in April the plants flowered, producing some very pleasing blooms.

Main Avenue.—The lawn which was laid out on the eastern side of the main avenue during the previous year is now well established. The border of shrubs on the same side and planted at the same time as the lawn, is making slow progress. Heavy mulchings of manure have been applied and better results are anticipated in the coming year.

Site of Arboretum.—A section of the Uba Cane plantation on the eastern side of the Main Avenue has been cleared of cane stools and the ground levelled in preparation for laying-out an arboretum of native and exotic trees. The following is a list of the trees planted during 1935:
Ficus benjamina, Ficus Krishnae, Poinciana regia, Spathodea campanulata, Tecoma spectabilis, Lagerstroemia flos-reginae, Dillenia indica, Barringtonia speciosa, Cassia grandis, Triplaris americana, Terminalia catappa and *Chrysophylum cainito.*

Extensions.—In view of the decision of His Excellency the Governor to erect a Band stand in the Gardens a site has been cleared to the north of the Wild Garden. A number of Mango Trees was dug out and the ground levelled and planted with grass. The ornamental trees on the south and west of this site provide a cool and restful setting in the afternoon.

Parking Square.—A low wall was constructed along the western boundary of the Parking Square to conform with the wall on the eastern side. In conjunction with this work the opportunity was taken to widen the "Parking Square" at the place where the waste water from the Reservoirs and Plant Houses passes under the road. To do this the culvert had to be extended 18 feet.

Band Concerts.—The Jamaica Military Band arranged a band concert in the Gardens on Sunday March 31st from 4.30 to 6.00 p.m. It was the first occasion on which a band concert had been given in Hope Gardens and the event attracted a large number of visitors. The band gave another concert on Sunday, April 14th. His Excellency the Governor who was attended by Captain Harvey A.D.C. was present on this occasion.

Floral Exhibitions.—The Public Gardens staged non-competitive groups of cut-flowers and orchids at the first Flower Show organized by the Jamaica Horticultural Society which was held at the Mico College on April 10th. An exhibit of cut flowers was staged in conjunction with other Departmental exhibits at the All Island Agricultural Show held at May Pen on April 22nd. A non-competitive group of Orchids

was sent to the Manchester Horticultural Show which was held at Mandeville on May 24th. A representative collection of Orchid blooms was contributed from the Gardens to the Jamaica Orchid Society's Exhibit of Orchid blooms which was sent on the Pan-American Airplane to the International Tropical Flower Show held at Miami, Florida on March 12th. The Society was awarded the American Orchid Society's Medal for its Exhibit. Floral decorations and palms were supplied from the Gardens for decorating the Ward Theatre and the Victoria Pier on the occasion of His Royal Highness the Duke of Gloucester's visit to Jamaica, March 6th to 16th.

Visitors.—Among the distinguished visitors to the Gardens during the year was His Royal Highness the Duke of Gloucester. A large number of tourists visited the Gardens throughout the year.

Botanical Specimens.—In December a large number of Botanical specimens were supplied for the Cambridge Local Examinations, Junior and School Certificate.

Correspondence.—During the year 2,124 letters were received in the Office and 1,085 letters were sent out, not including stereotyped circulars which are sent out in reply to letters in connection with purchase of plants and replies to inter-departmental minutes.

Lectures.—At the Agricultural Short Course for Agricultural Instructors the Superintendent of Public Gardens gave a lecture on Cane Farming in relation to the Small Cane Farmer.

Meetings.—The following meetings, etc. were attended by the Superintendent of Public Gardens:

January—Attended conference in the Director's Office in connection with the All Island Show at May Pen.

Attended Staff Conference of the Officers of the Department.

May—Attended opening of the Government Low Temperature and Marketing Experiment Station by His Excellency the Governor.

June—Attended meeting at Director's Office with reference to the Agricultural Short Course for Agricultural Instructors.

December—Attended meeting at Director's Office with reference to Staff Conference to be held in January, 1936.

The Horticulturist attended the Departmental Staff Conference held on January, 14th.

Routine Work.—The routine work of the maintenance of the Gardens and the propagating and distribution of nursery stock was regularly attended to.

PLANTS DISTRIBUTED FROM HOPE GARDENS, 1935.

Sold.

Economic Plants—		
Coffee ..		16,612
Citrus Seedlings		3,903
Citrus-Budded Plants		238
Mango-Grafted Plants		336
Miscellaneous		2,033
		23,122
Ornamental		23,704
		46,826

Free Grants.

Economic Plants—		
Coffee ..		2,580
Citrus Seedlings		274
Citrus-Budded Plants		44
Timber Trees		9,605
Miscellaneous		345
		12,848
Ornamental		3,989
		16,837
Total Number of Economic Plants ..		35,970
Total Number of Ornamental Plants		27,693
Total Number of Plants Distributed..		63,663

The following statement shows the distribution of plants for the past five years from the Nursery at Hope:—

	1935.	1934.	1933.	1932.	1931.	Total.
Coffee	19,192	12,116	8,656	15,891	28,044	83,899
Cacao	..	..	..	194	76	270
Citrus Seedlings	4,177	1,603	6,358	52,740	31,584	96,462
Citrus-Budded Plants	282	1,256	859	1,122	1,010	4,529
Mango-Grafted Plants ..	336	975	1,520	865	1,322	5,018
Cane Tops and Cuttings ..	141,880	163,785	226,864	261,233	171,337	965,099
Elephant Grass Cuttings ..	..	600	500	9,500	9,800	20,400
Timber Trees	9,605	3,341	16,102	10,767	56,864	96,679
Miscellaneous Fruit and Economic Plants	2,378	3,239	12,187	8,373	6,643	32,820
Ornamental Plants	27,693	26,867	15,425	27,167	33,183	130,335
	205,543	213,782	288,471	387,852	339,863	1,435,511

2. Castleton Gardens.

Weather.—The rainfall for the year was 189.10 inches. During August and October there were deposits of 25.47 inches and 51.42 inches respectively which damaged the pathways through the Gardens and gravel had to be headed from the river to resurface them. The hurricane which passed to the east and then to the north of the Island damaged this Garden. A large *Araucaria Bidwillii* which was growing near the Foreman's House was blown over, damaging the house.

Garcinia Mangostana.—Some of the trees planted during 1920-22 fruited for the first time this year. The old trees produced a large crop of fruit during the summer.

Building.—The Public Works erected a rustic Rest House near the Tourist Tea House.

Routine.—The general routine work of billing lawns, opening flood drains, repairing pathways, forking and weeding borders and propagating plants for nursery sale was regularly attended to.

Visits.—These Gardens were regularly inspected by the Superintendent and the Horticulturist.

Plants Distributed from Castleton Gardens, 1935.

Sold.

Economic Plants	36
Ornamental Plants	401
	437

Transferred to Hope.

Economic Plants	781
Ornamental Plants	11,450
	12,231
Total Number of Economic Plants	817
Total Number of Ornamental Plants ..	11,851
	12,668

3. Public Gardens, Kingston.

Parade Court House Site.—The Work of transforming this site into lawns and flower beds was completed in the early part of the year. Ten beds were laid out on the site in which varieties of Cannas have been planted. Four *Poinciana regia* were planted around the drinking fountain situated in the centre of the site.

King Street Lawns.—Three sections of the lawns in front of the Public Buildings were dug up and replanted with Bahama grass.

Coldstream Guards Band.—On February 8th the band of the Coldstream Guards stopped in Kingston for a few hours on its return from Australia to England. The band gave a concert in the Victoria Park at which His Worship the Mayor and officials of the Kingston and St. Andrew Corporation were present.

Water Lily Tank.—The central lily tank was emptied and cleared of water weeds and new mounds of earth prepared for replanting water lilies.

Routine Work.—The general routine of maintaining the Victoria Park, the lawns around the Public Buildings, the Memorial Square, the old Treasury site and Headquarters House garden was regularly attended to.

4. Hill Gardens, Cinchona.

General.—The Superintendent visited the Hill Gardens, Cinchona and remained in residence for one week. During this visit a plot of land was selected for a Coffee Nursery in which to grow seedlings for providing plants for coffee growers at high elevations.

Two Assam Tea plots approximately 1 acre each which were planted in 1885 at Upper Buzza and Latimers have been cleared of all forest trees and undergrowth and the large tea bushes have been pruned. The tea trees were still in a very healthy condition after being neglected for 50 years and fighting for existence against a thick growth of forest trees. The pathways to these two plots which were in very bad condition have been cleared of small growth, repaired and widened where necessary. Owing to these pathways not having been used for many years they were in very bad condition and in some places dangerous.

The circular tank which supplies water for the lower nursery was cleaned out and repaired.

The Glass House which served as a catchment for filling the two tanks with water for domestic purposes was badly in need of repairs. The necessary repairs were done by the Public Works Department. The two tanks which supply water for use in the house were leaking badly and these were also repaired by the Public Works Department.

Christmas Trees.—A large number of Pines and other suitable trees were again supplied from the Cinchona woodlands to meet the demand for Christmas Trees.

Miscellaneous.—The usual demand for Tree Fern Roots for potting orchids, moss and miscellaneous plants was supplied from Cinchona.

Routine Work.—The usual routine work of mowing lawns, weeding and forking borders, repairing pathways and clearing woodland pathways was regularly attended to. The Gardens in general were satisfactorily maintained by the Foreman in charge with the limited funds voted for the maintenance of the Gardens and the Woodlands at Cinchona.

5. King's House Gardens and Grounds.

Bulbs and Flower Seeds.—Five hundred Gladioli, one hundred Dahlia tubers and an assortment of annuals were purchased for the Flower Garden. Lady Denham who is a very keen gardener, while in England selected a variety of seeds and bulbs, many of which had not been tried at King's House before and presented them to the Gardens. Some of these are showing promise of being successfully grown during the winter months. Dahlia tubers planted out early in June bloomed profusely during the summer and produced large flowers.

Borders.—Two borders were made to the east and north of the sunken garden. The border on the east is planted with a variety of ornamental and flowering shrubs and the other planted alternately with Poinsettias and White Lagerstroemia.

Tree Planting.—His Royal Highness the Duke of Gloucester planted a *Cassia grandis* on the lawn to the south of the Tennis Courts. Their Royal Highnesses the Duke and Duchess of Kent each planted a *Cassia grandis* plant on the lawn near the Lily Tank on the occasion of their visit to Jamaica.

Tennis Courts.—The tennis courts which were becoming worn of grass in spots were dug up where necessary and replanted, and the two courts given an application of fertilizers. A third tennis court was laid out and the site levelled and planted with grass by the Public Works Department. It was then taken over by this Department to be completed. Owing to the infertility of the soil it has been difficult to get an even growth of grass all over the court.

Plant House.—A small plant house was erected in the Nursery. In the past it was very difficult to germinate seeds during the period of heavy rains without a plant house as most of the seeds were either washed out of the boxes or the young seedlings were killed by damping off.

Beds.—The triangular bed of *Agave variegata* at the entrance to King's House was, by request, dug out and planted with varieties of Hibiscus.

Orchid Plants.—The orchid plants which were in very poor condition were taken to Hope, repotted and returned to King's House. Two of the plants which had lost all their roots, died.

Floral Decorations.—The Horticulturist carried through the floral decorations of King's House on the occasion of the visits of Their Royal Highnesses the Duke and Duchess of Kent and the Duke of Gloucester.

Presentation of Orchids.—On the eve of the departure of the Duke and Duchess of Kent a box of Orchid blooms was graciously accepted by Her Royal Highness from the Department and members of the Jamaica Orchid Society.

Kitchen Garden.—The kitchen garden site has been extended to supply a more varied assortment of fresh vegetables for the domestic requirements of King's House.

Pastures.—The pastures under the care of Mr. Harold Bolton and Mrs. J. A. Crooks were maintained in a satisfactory condition. The pastures under the control of the Department were cleaned during the year and the fences kept in good condition.

Routine.—The general routine work of billing and mowing lawns, mending pathways, forking and weeding borders, renewing and making flowerbeds and propagating plants was regularly attended to.

6. Gordon Town Garden.

The small garden at Gordon Town was maintained in a tidy condition out of the Hope Gardens Maintenance Vote.

7. Bath Garden and Nursery (St. Thomas).

Mr. R. Glen Campbell, Inspector of Plant Diseases, is in charge of this Garden and Nursery.

Nursery.—The coffee nursery has been maintained and extended to keep up with local demands.

Flower Beds.—Several new flower-beds were made and planted with a variety of Cannas and Coleus supplied from Hope Gardens.

Talipot Palm.—A Talipot Palm (*Corypha umbraculifera*) flowered during the year, this being the third Talipot to flower in these Gardens.

Visitors.—There was a large number of visitors to the Gardens during the year.

Routine.—Routine work has been maintained and the Gardens have been kept in a tidy condition.

SUMMARY OF PLANTS DISTRIBUTED BY THE DEPARTMENT DURING THE LAST FIVE YEARS.

	1935.	1934.	1933.	1932.	1931.	Total.
Coffee	19,192	12,116	10,356	15,891	28,044	85,599
Cacao	..	..	..	419	78	497
Citrus-Seedlings	4,177	1,603	6,358	52,760	31,584	96,482
Citrus-Budded Plants	282	1,256	859	1,122	1,010	4,529
Mango-Grafted Plants	336	975	1,520	865	1,322	5,018
Canetops and Cuttings	141,880	163,785	226,864	261,233	171,337	965,099
Elephant Grass Cuttings ..	..	600	500	9,500	9,800	20,400
Timber Trees	9,605	3,341	16,102	10,767	56,864	96,679
Miscellaneous Fruit and Economic Plants	2,414	3,429	14,147	8,463	6,734	35,187
Ornamental Plants	28,094	26,867	22,746	28,141	33,940	139,788
	205,980	213,972	299,462	389,161	340,713	1,449,278

9. The Plantation and Garden Sales for the last five years have been as follows:—

1935	£375 4 8
1934	509 13 1
1933	550 8 6
1932	613 1 9
1931	699 11 1

10. The Rainfall at the various Gardens for the year under review is as follows:—

1935.	Hope Gardens.	Castleton Gardens.	King's House Gardens.	Public Gardens Kingston.	Hill Gardens, Cinchona.
	Ins.	Ins.	Ins.	Ins.	Ins.
January	.23	2.50	.57	.87	2.19
February	3.17	14.29	1.88	.12	5.14
March	1.88	10.44	.98	.46	5.16
April	.53	1.90	.28	..	.65
May	3.69	16.61	4.64	.26	7.36
June	3.58	13.39	1.05	2.08	3.06
July	1.25	5.84	2.10	.23	1.62
August	8.00	25.47	4.74	4.81	11.15
September	11.26	19.70	10.93	6.89	16.46
October	19.01	51.42	16.43	11.28	21.43
November	.55	7.01	.04	.14	5.23
December	.60	20.53	.40	.64	5.19
	53.75	189.10	44.03	27.78	84.64

Rainfall for the Five Years 1931-1935.

Year.	Hope Gardens.	Castleton Gardens.	King's House Gardens.	Public Gardens, Kingston.	Hill Gardens, Cinchona.
	Ins.	Ins.	Ins.	Ins.	Ins.
1931 ..	61.87	148.87	48.92	34.17	105.51
1932 ..	50.15	142.25	34.05	23.58	78.84
1933 ..	113.28	298.20	50.93	74.52	170.42
1934 ..	58.17	183.61	44.55	26.33	95.85
1935 ..	53.75	189.10	44.03	27.78	84.64

11. Contributions to the Gardens have been received from the following:—

Local.

Miss M. Gamble, Holywood, Halfway Tree
L. L. Carrington, Halfway Tree.
C. C. Kelly, 3 West Ave., Kingston Gardens.
Mrs. Trench, Halfway Tree.
Jamaica Agricultural Society, Kingston.
Wm. Cradwick, Mandeville.
N. J. Sorapure, Port Maria.
G. P. Dewar, Harmony Hall, Duncans.
Richmond Estates, Laughlands.

FOREIGN.

Dr. M. Grabham, English Rooms, Madeira.
H. C. Sampson, Economic Botanist, Kew, England.
United States Department of Agriculture.
J. Hasely, 174 The Boulevard, Punchbowl, N.S.W.
Department of Agriculture, Barbados.
Director Jardin de Aclimatacion de la Orotava, Teneriffe.
E. M. Verges 2nd, 1126 Beacon St., Brooklyn, Mass.
Dr. Popenoe, Tela, Honduras.
Department of Agriculture, Kampala, Uganda.
Vilmorin Andrieux et Cie, Paris.
E. E. Cheesman, Imperial College of Tropical Agriculture, Trinidad.
F. G. Walsingham—Harvard University, Cuba.
G. C. V. Erskine, H. M. Consul, Western Abyssinian Plateau.
J. A. Downs, 1 Arlington St., Winchester, Mass.
Department of Agriculture, Trinidad.

M. S. GOODMAN,
Superintendent of Public Gardens.
E. J. DOWNES,
Horticulturist.

B. AGRICULTURAL EXPERIMENTS, EDUCATION AND FIELD SERVICES.

(ii) *Report of the Superintendent Experiment Station, Hope.*

Weather.—The rainfall for the year under review at the Station was 53.75 inches, slightly above the average for the past 54 years, but this was badly distributed over the year. The precipitation during four months of the year was only 1.91 inches. The greater part of the rain fell in August, September and October when there was a deposit of 38.27 inches, more than half the rainfall of the entire year.

There was an amount of £110 voted for repairs to the Reservoir and laying down a new cast iron pipe line to the Station. This work was undertaken by the Public Works Department but it has not yet been completed. The crops suffered during the very dry periods owing to there being no water for irrigation.

Distribution of Cane Varieties.—During the year 141,880 tops and cuttings of the different varieties of sugar cane were distributed, making a total of 4,689,935 tops and cuttings distributed free to estates and small cane farmers for the past sixteen years.

The following is a list of the varieties and quantities distributed for the five years 1931-1935.

Varieties.	1935.	1934.	1933.	1932.	1931.	Total.
P.O.J. 2878 ..	58,961	73,449	74,869	112,538	33,549	353,366
Uba ..	22,948	11,850	22,797	31,200	46,204	134,999
P.O.J. 2714 ..	12,262	18,548	21,701	24,707	18,744	95,962
P.O.J. 2725 ..	11,953	26,492	52,032	57,179	43,722	191,378
P.O.J. 2727 ..	10,612	9,178	22,922	21,807	18,594	83,113
B. 726 ..	9,197	6,764	4,315	400	..	20,676
B.H. 10/12 ..	4,591	2,315	5,135	1,012	2,111	15,164
E.K. 28 ..	3,485	2,784	6,175	4,804	1,012	18,160
Ba. 11569 ..	1,544	1,121	620	460	733	4,478
White Transparent	1,272	3,773	2,878	1,196	2,034	11,153
Co. 281 ..	1,000	500	200	500	..	2,200
Co. 213 ..	1,000	500	200	500	..	2,200
S. C. 12/4 ..	864	3,808	3,675	2,659	2,936	13,942
Mayaguez 28	792	12	..	..	..	804
Fajardo Central 916	699	..	..	..	..	699
H. 109 ..	400	200	36	12	..	648
Mexican Striped	300	824	208	836	..	2,168
B. 417 ..	..	1,255	5,036	998	484	7,773
B. 891 ..	..	412	4,015	400	..	4,827
Badilla ..	..	..	50	25	716	791
B. 1529 ..	..	..	..	..	500	500
Total	141,880	163,785	226,864	261,233	171,339	965,101

It will be seen from the above list that the demand for those varieties which are highly resistant to Mosaic Disease is far in excess of the demand for the more susceptible varieties. Small settlers, when applying for cane varieties, are always supplied with those which are highly resistant to Mosaic Disease, as it is difficult to get the small cane farmer to rogue for Mosaic Disease.

Cane Varieties.—Small quantities of the two varieties Mayaguez 28 and Fajardo Central 916 which were imported during 1933 and grown under quarantine, were distributed to the various estates. A plot of each approximately 3 square chains in area was planted out in the Station for general distribution in larger quantities during 1936. Observations on the two varieties above are very limited and the following points must not be taken as conclusive as they are only on a small plot grown in the Station.

Mayaguez 28.—Apparently a slow grower but vigorous stooler, covers up quickly at an early stage in growth and saves weeding. Appears to be highly resistant to Mosaic Disease. In growth it is much like the P.O.J. 2725 which is one of its parents.

Fajardo Central 916.—A good germinator and quick grower but does not stool out until late in growth. Does not appear to be as highly resistant to Mosaic Disease as the Mayaguez 28. In habit and growth appears similar to S. C. 12/4 which is one of its parents. Both these varieties are seedlings of a cross between the P.O.J. 2725 and S. C. 12/4.

P.O.J. 2878 has again this year been in great demand. The largest quantity of cuttings distributed was of this variety. Cane farmers are getting good tonnage from this variety and it is being distributed in large quantities to small cane farmers both on account of its high yield and its resistance to Mosaic Disease.

The varieties P.O.J. 2725, 2727 and 2714 have also been distributed to the small farmers in fairly large quantities.

The B. 726 is not very promising in the Station and is very susceptible to Mosaic Disease. Although of a high purity of juice it is not advisable to distribute this variety to the small farmer.

No new varieties have been imported this year but importation of several varieties has been arranged through the newly established Quarantine Station at Trinidad.

A plot of very old ratoons of P.O.J. 2725 was dug out to make room for extending the varieties Mayaguez 28 and Fajardo Central 916.

The plot of B. 726 which was planted last year became so heavily infected with Mosaic Disease that it had to be destroyed.

Pigeon Peas.—The old banana field which was thrown out of cultivation at the end of last year was planted in the following varieties of Pigeon Peas, viz.: Variety New Era Strain "X"; Variety New Era strain "D"; Variety Local Grey and Variety Prensado. During the early period of growth of these plots the plants suffered badly from an attack of thrips which affected the bearing of the plots. Seeds of the above varieties are now available for distribution in small quantities.

Citrus.—Budding of the Marsh Seedless grapefruit was discontinued during the year as the Caymanas Nursery was supplying all the plants necessary for the demand. Navel Oranges are being budded in larger numbers to supply the increasing demand.

The School Garden site which was abandoned last year is now being used as a citrus nursery.

Several old grapefruit trees were top-worked during the year and budded with Marsh Seedless Grapefruit.

Cover Crops of leguminous plants such as Bengal Bean, Bush Velvet Bean, Jerusalem Pea, Overlook Bean and Crotalarias were grown through the old citrus grove to assist in keeping down weeds and improving the soil. It was quite noticeable that the portion of the grove through which leguminous plants were grown stood up to the drought much better than the portion without any cover crop.

The Eddie Wasp (*Eretmocerus serius*, Silv.) continues to keep the groves and young budded plants practically free of the Black Fly which gave quite a lot of trouble in the past to keep it in check.

The trees in the old grove were pruned where necessary and the land forked and given a dressing of stable manure.

A few of the old trees developed gummosis. These were treated in the usual way and the damaged surface covered with Bordeaux paste.

Coffee.—The coffee plots gave a heavy yield this year. The plants had been pruned and the plot forked and large quantities of dry leaves which were used as mulch were forked into the soil and this helped to improve the plants.

Cacao.—The Cacao plot which was used as a demonstration plot for the Farm School Students has been destroyed to make room for a proposed band stand site.

Vegetable Experiments.—During October, 1935, an experiment concerned with the growth and marketing of vegetables for export was started at Waltham Farm (the property of Mr. Glaister Baxter on the Liguanea Plains) which was adequately equipped with irrigation facilities. For the purposes of the experiment 2.6 acres were acquired of which 12 square chains were allotted for the growing of tomatoes.

The twelve square chains were divided into two sections "A" and "B" by a pathway about 4 feet wide. The former section was 8 square chains and the latter 4 square chains. Both were easy of access for supervision and irrigation.

In Section "A" the previous crops had been tomatoes followed by various vegetable and provision crops. The soil varied markedly in texture being fairly heavy on one side of the field and changing rapidly to a light sand on the other.

In section "B" the previous crop had been tobacco followed by Guinea corn. The soil in this section was fairly uniform throughout, consisting mainly of fine sand.

The date on which the experiment was started being some what later than the time usually considered most propitious for the growing of tomatoes on the Liguanea plain it was decided to sow the seed in seed beds and then transplant direct into the field.

The varieties of Tomatoes tried were Potentate, Ailsa Craig, Experiment Station No. 1, Tuckswood, Beecham Leigh, Waterbaby, Riverside, 1933 Buckley, Comet, Sunrise, Kondine Red and Best-of-All.

All the varieties made good growth during the first two months after planting, but it was soon observed that this experiment was doomed owing to the severe attacks of Nematodes (*Heterodera radicicola*) and Mosaic Disease, which between them were responsible for the loss of 50% of the plants.

Insect Pests.—Nematodes—damage very serious, particularly in the portion of the field in which tobacco was grown previously. Attacked plants, on observation, were immediately pulled up and burned. Minor damage was done by other insects such as caterpillar, the Tobacco Horn-worm and the Flea-beetle, but these were controlled by spraying and picking.

Diseases.—Mosaic Disease—damage serious, none of the varieties showed any signs of resistance.

Cladosporium only developed serious proportions after most of the fruit had been reaped.

Physiological.—The loss from splitting of fruit was considerable.

The remaining 14 square chains were planted with—

Eggplants—varieties, Florida High Bush and Fort Meyers Market.

Peppers—variety, California Wonder.

Cabbage—Copenhagen Market.

Eggplants.—These grew into very vigorous healthy plants and produced a large crop of fruit. The fruit were uniform in shape and very few rejections were made on account of malformation.

The plants were almost free from any disease and insect pest. A few trees at the early stages of growth were lost from attacks of ants at the roots.

Peppers.—These grew vigorously and developed into strong healthy plants but owing to being planted rather late in the season did not produce as large a crop as was expected. Quite an appreciable loss of fruit was sustained through sun-scorch.

Mosaic Disease.—Loss appreciable.

Insect Pests.—Minor damage only.

Cabbages.—Unfortunately this crop was planted late in the season and considerable damage was done by aphids and caterpillars. The damage by these pests was so great that it was considered inadvisable to make any shipments.

Markets.—The Tomatoes, Peppers and Eggplants were shipped to England. The packing, etc. was undertaken by the Microbiologist.

Potatoes.—Eight varieties of potatoes received from The Department of Agriculture, Barbados, viz.: Red Nut, Six Weeks, B. 5, B. 6, B. 9, B. 13, B. 44 and V. 52. Cuttings of these are available for distribution.

Yams.—A variety known as "Horn Yam" was received from the Department of Agriculture, Barbados.

Cover Crops.—The following were tried out this year in the citrus plot. *Crotolaria usaramoensis Crotolaria spectabilis*, Jerusalem Pea, Bengal Beans, Bush Overlook Bean, Bush Velvet Bean and *Tephrosia Vogelii*. All the varieties made good growth under the conditions in this dry area and show promise of being suitable for growing in citrus groves. The Bengal Beans made very vigorous growth and had to be often cleared off the citrus trees, but it compensated by keeping down weed growth. The *Crotolaria spectabilis* developed a severe attack of Mosaic Disease and had to be destroyed.

Diseases.—Mosaic Disease was negligible in the susceptible varieties of cane this year S.C. 12/4 and B. 726 being the only varieties attacked.

Insect Pests.—There was little evidence of the attacks of Moth Borer.

Thrips.—There was a severe attack of thrips on the Pigeon Pea varieties which reduced their bearing considerably.

Repairs to roads and pathways were done during the year and the Station kept in a tidy condition.

M. S. Goodman,
Superintendent.

(iii) *Report of the Superintendent of Sugar-Cane Experiments.*

Weather.—The rainfall during the year under review was irregular, while some of the Sugar-cane districts got their usual seasonal rains, other districts were very dry, so much so that an appreciable loss was sustained by the drying out of the old canes in these areas. This unusual weather occurred in two sugar-cane districts and their estimated yields were reduced. The two hurricanes which passed very close to the Island in September and October did no damage to the cane crop.

Varieties.—The B.H. 10/12 is still considered the most suitable and general purpose cane for the large cane farmer in most of the cane districts. On the rich, deep, alluvial soils to be found in most of the sugar-cane growing areas, this variety gives a good tonnage for plant canes and also ratoons well for many years.

P.O.J. 2878 has been planted on a fairly large area in most of the cane districts. It has given good results as a plant cane in every district but its ratooning generally is not as good as the B.H. 10/12, though on a few estates it gives good results as ratoons. On many estates where Mosaic Disease is giving trouble on the B.H. 10/12 this cane is being superseded by the P.O.J. 2878.

The P.O.J. varieties 2727 and 2725 are in most places being replaced by the P.O.J. 2878. The profuse arrowing of the 2725 and drying out if not reaped immediately after flowering are very undesirable qualities. The P.O.J. 2727 continues to do well on a few estates.

E.K. 28.—This variety has been extended on a few estates and has given promising results in tonnage and quality of juice.

S.C. 12/4.—This cane is gradually being discarded on estates owing to its susceptibility to Mosaic disease and poor ratooning. There is one estate where this cane ratoons well and is not troubled to any extent by Mosaic Disease.

B. 726.—This cane is not fancied by planters although at the beginning of reaping the quality of the juice is much better than any other variety and would fill the long needed requirement for a cane suitable for early reaping. This cane, although not giving as good a tonnage as the B.H. 10/12 at the beginning of the reaping season, owing to its better quality of juice, will give an equal quantity of sugar per acre.

Mayaguez 28 and Fajardo Central 916, new varieties which had been grown under strict supervision locally, have been distributed in very small quantities to all the sugar estates.

C.O. 281 and CO. 213 have for years been offered for trial under certain conditions in which it was presumed it would thrive and give better returns than the varieties at present under cultivation but this advice has only now been accepted on a few estates.

Manurial and other Experiments.—Manurial Experiments were reaped at the following places: Long Pond, Gray's Inn (2), Duckenfield, Hampden and Georgia. The experiment at Swanswick could not be reaped as some of the plots were badly damaged by rats and others were put on gall spots which were not observable when the plots were laid out. Manurial experiments were laid down on the following estates: Duckenfield, Georgia, Holland, Richmond, Long Pond and York.

Variety experiments for early and late reaping were laid down at Belleisle Estate.

Cultivation.—Besides the Gyrotillers which have been imported and which have done much to improve the cultivation on several estates there are other implements which have also been imported for inter-cultivation between the cane rows. These are doing good work and take the place of the old practice of hand forking which in many instances could not be relied on. Planters are high with their praise of the perfect work being done by the Gyrotiller and the good results in tonnage of cane that they are getting owing to the better cultivation of the land.

Extensions.—During the year there has been no appreciable increase in acreage by the large cane farmers. The small cane farmers are increasing yearly and are now becoming large producers of sugar-cane for the factories. The increase of production of sugar for the present crop which is the largest ever produced in the island is partly due to the increase of small cane farmers.

Factories.—A new factory is in course of erection in St. Catherine and should be completed in time to take off a portion of the 1936 crop. Other factories have installed additional machinery to bring them more up-to-date. Every factory is now more or less under chemical control.

Yields.—The average yields of ton canes per acre was on the whole about the same on each estate as for the 1934 crop. But the sucrose and purity of the juice were better than for many years, thus the tons of cane taken to produce a ton of sugar was much less than in previous years.

Diseases.—Mosaic Disease is still very prevalent in some districts chiefly among the small cane farmers. It has been the policy of the Department to distribute only highly resistant varieties to the small farmers but they persist in planting the B.H. 10/12 and then will not rogue except they are forced to do so.

Root Disease was again this year very noticeable on a small number of estates. This disease appears to be increasing in a few districts on the north side of the Island.

Eye spot was not so noticeable this year as in the past two years.

Insect Pests.—The Moth Borer which is controlled by natural parasites was not considered to have done much damage this year, although there were a few small areas which were infected but not to an alarming extent. Some estates adopt the methods of cutting out dead hearts and trashing the canes for controlling this pest.

Sugar-cane Aphis was very bad on some estates during the dry season but disappeared as soon as the rainy season started. The B.H. 10/12 seems to be more often attacked by Aphis than any other variety.

Visits.—Special and periodical visits were made to the sugar estates at the request of planters during the year to investigate various troubles that occurred, and to give advice. Planters look forward to the periodical visits when the merits of the cane varieties grown by them are discussed and information is given with regard to the results obtained from varieties grown on other estates similar in soil and climate. These visits have been of great benefit both to the planters and to the Department.

Planters, when in Kingston, also visit this Office to discuss matters of interest to them but which do not necessitate a special visit of investigation to the Estates.

M. S. Goodman,
Superintendent Sugar-cane Experiments.

(iv) *Report of the Superintendent of Agriculture.*

1. I have the honour to submit this my Report for 1935.

2. I acted as Agricultural Chemist in addition to my substantive duties from the 30th April to the 5th December during the absence on leave of the Agricultural Chemist.

3. *Banana Experiments.*—(a) *St. Mary Series.*

Through the co-peration of the Banana Company of Jamaica who supplied the manures and the cost of application, the experiments originally laid down in 1934 were continued.

These experiments were designed to test out the effect of (i) Inorganic manures, (ii) Organic manures, with and without inorganic, (iii) Green manures alone, and with the addition of inorganic fertilisers.

Each series was laid out in the form of a Latin square, and a fourth block was added to co-relate the treatments in Blocks 1, 2 and 3.

The experiments were tried on plants, and each plot contained 24 trees. Blocks 1, 2 and 4 each contained 25 plots, and Block 3, 36 plots. It will be seen that each experiment contained 111 plots.

The experiments were carried out on three plantations representing different soil types of St. Mary, so that the results would be applicable to the lands of both small and large planters.

In view of the difficulties attendant on recording other data, it was decided that the yields of commercially saleable fruit should be the ultimate test of the experiment.

There are several factors requiring consideration in an experiment on the banana which are not present in a crop like the sugar cane. The most important consideration from the planter's point of view is the grade or number of hands per stem, as his fruit is sold on this basis. The weight per stem is the next important factor, as there might be rejections if this is not satisfactory. A third factor is the time taken for the fruit to mature. A fertiliser which increased the weight per bunch without affecting the grade would be of material benefit to the marketing company who sell by weight, but would not have the same interest to the grower whose fruit is bought by the grade. The time factor is of considerable benefit to the planter as any decrease in the time taken for the fruit to mature would mean a material gain to the grower.

The banana is propagated from "suckers" whose size and degree of maturity vary to a considerable degree. A field of plants will therefore present on close inspection a considerable variation in the rate of initial growth. In some cases the first suckers planted do not grow, and a "supply" is put in its place about six weeks after the original planting. Under the field conditions it was almost impossible at the end of four months to determine the difference between a backward plant and a "supply." The result of this variation in the original suckers is shown in the long period during which the crop is reaped. In the experiment, which was not severely affected by the drought, the first bunch was reaped on the 30th of April, and at the end of September when the experiment was blown down, only 2085 of a possible 2664 bunches had been recorded. The number of stems reaped from the different plots varied considerably as full yields were recorded against some, whilst in others less than 50% of the crop had matured. If the fields are plotted out diagrammatically it does not appear that the fertility variation of the soil could account for the fluctuations in the field, and that the difference in the time taken for the plant to mature must have had some relation to the original selection of suckers. This variability, due to selection of "followers" will also be evident in the ratoon crops as the personal factor of the pruner must affect the time of maturity of the ratoons.

The recording of the yields from a crop whose period of reaping extended over a period of twelve months presented a certain amount of difficulties. Tags were made from galvanised iron sheeting and painted with the plot number. At intervals the experiments were visited and each bunch tagged with its plot number. These labels remained on the bunches until they reached the loading station when the weights and grades were recorded before the tags were removed.

When the plots were blown down we had graded and weighed 5,184 stems. The figures of the average weights of the bunches should provide some interesting facts.

The effect of drought on the grade of the fruit was not apparent up to the time the experiments were destroyed, but the effect on the weight of the fruit is well illustrated at Hopewell Estate where the seven hand stems reaped during May and June weighed over 45 lbs. each, whilst in July and August after a very dry period, the average had dropped to below 35 lbs.

Two of the estates on the coastal section had almost no rainfall during the first part of the year, and by the end of July the plants had suffered so much that they had begun to collapse from lack of water. The management of the estates decided to "cut back" these fields, and these two experiments had to be abandoned.

The results obtained up to the time when the three fields were destroyed either by drought or the ensuing storm are not sufficiently complete to draw any reliable conclusion. It would appear that the plants had made a preliminary reaction to the manures but the weather conditions were such as to prevent the development of any benefits which should have been derived from fertilisers.

The experience gained in the technique of carrying out these experiments and the data recorded has been considerable, and it is proposed to continue these experiments during 1936. I have to record the splendid assistance given us by the management of the Banana Company of Jamaica, and to the managers and assistants on the plantations on which the experiments were conducted. Without the co-operation of the staff of the plantations, it would have been possible to have obtained only a portion of the data recorded.

(b) *Other Series.*

A smaller experiment to determine the values of mineral fertilisers was carried out at Holland Estate in St. Thomas and records were obtained of yields up to the time of the storms. A similar experiment was conducted at Grove Place. It is to be regretted that the experiments on other plantations which were designed by the Department but which we were unable to supervise, have not provided any data. It is hoped that it will be possible to make the necessary arrangements for the proper supervision of any new plots which are put down in the future.

A problem which has arisen from the banana experiments is the incidence of Panama Disease in the plots. Fertilisers would obviously be of more value on the lands which have been in continuous cultivation than on comparatively new land and in nearly all the old fields there is an infection of the disease. This incidence of the disease may prevent the continuance of an experiment over a period, and it is apparent that owing to the susceptibility of the banana to the effects of droughts and winds the only possible way to get results would be to average the yields from plots over a series of years.

The results obtained from the experiments will be embodied in a separate publication.

4. I assisted in the reaping and recording of the Sugar cane Experiments.

5. I visited and reported on properties offered to the Government for Land Settlement purposes. I also reported on certain schemes for the settlement of ex-soldiers.

6. Reports were also made on the agricultural possibilities of areas through which it was proposed to build roads.

R. S. Martinez,
Superintendent of Agriculture.

(v) *Report of the Headmaster, Government Farm School.*

I have the honour to submit herewith, the Report of the Headmaster of the Government Farm School for the year ending December 31st, 1935.

General.—The School completed a successful year, and public interest in the Institution was considerably greater than in the previous years. The number of applications received showed an increase, while the applicants themselves were of a higher educational standing than formerly.

It is very evident that the School can play a very important part in the Agriculture of the Island, as it provides an excellent opportunity for proper instruction in the main industry of Jamaica, both from a practical as well as a theoretical point of view, and it is unfortunate that more of the young men do not take advantage of the facilities offered. Due to storms of recent years, combined with the general depressed conditions in agriculture, the applications for admission, while not falling in number have not shown any material increase. I am pleased to report however, that for the Christmas Terms this year, the appli-

cations showed a considerable increase in number, and the class is nearly the maximum number of students which can be taken.

Attendance.—During the year under review the School had an average attendance of 44 students, which number was the same as for last year. The number of students in the School for each term of the year was as follows:—

Term.	Years.			Total.
	I	II	III	
Easter	15	14	14	43
Midsummer	15	14	14	43
Christmas	17	15	14	46

While the Institution has been running to only about two-thirds capacity during the last few years, there appears to be a greater interest being taken in the question of Agricultural Education, with the result that more applications are being made for admission to the School.

Government Farm School's Silver Anniversary.—The Government Farm School was opened in January 1910, and this year celebrated its twenty-fifth anniversary. During the quarter century of the School's operation 468 students have been enrolled, and of this number 431 have been graduated. The majority of the graduates are pursuing work directly connected with agriculture, and while the larger number are resident in Jamaica, many have sought their fortunes further afield. The records show that Farm School graduates are to be found in England, Canada, Trinidad, Bermuda, British Honduras, Central America, Haiti, Spanish Honduras, Cuba and Panama. During the years the School has been in operation it has played a very important part for the betterment of agriculture, not only in Jamaica but in the West Indies generally, and it is hoped that as time goes on its scope will be extended, and that it may come to play an even more important role in the agriculture of the Island.

Graduation.—The Annual Graduation at the School was held on Thursday, July 4th, under the Presidency of the Director of Agriculture on which occasion fourteen students received Diplomas in Practical Agriculture. The recipients of the Diplomas were:—

Victor George Sylvester Amritt ..	Highgate
Victor Emanuel Anderson	Adelphi
Leslie Rupert Clarke	Alligator Pond
Charles Frederick Cooke	Somerton
Winston Percival Taylor Domville ..	Troy
Charles Wilbert Lawson Douglas ..	Kingston
Kenneth Anthony Gayle	Retreat
Audley John Harriott	Lincoln
Rupert Carlyle Jobson	Claremont
Ivan Wesley Lawrence	Lamb's River
Leopold Silvera Osborne	Bonny Gate
Hugh Marshall Peterkin	Carron Hall
Leslie Emanuel Thwaites	Kingston
Edwin Charles Valentine	Port Antonio

His Excellency the Governor addressed the Graduates and presented the Diplomas. There was a large gathering present of parents, and others interested in the work of the School. Facilities were made for those present to be shown over the School, and the Farm, and the work done by the students, explained.

Employment of Students.—Despite the fact that the storms during the year have rendered the economic position of the agricultural industry low, the demand for Farm School Graduates has been relatively good and a number of students have found employment. The demand for boys trained at the School has been fair, and it is hoped that as soon as the areas which were badly damaged in the recent storms come into production again, the demand for Farm School Graduates will show an increase.

Curriculum.—The curriculum as outlined in the Prospectus of the School, was carried out, with the exception that at the beginning of the Christmas Term, the subject of Surveying was discontinued as a Third Year subject, and given to the Second Year. This change was found necessary since the Third Year students spend half of each term at Grove Place, and it was therefore possible to give only 18 lectures in Surveying, which was found to be insufficient. The change of this subject to the Second Year is working well.

For some time, the question of specialization in some phase of agricultural work has been considered, but as the facilities for such work at present are very limited, it is not possible. In order to give the Third Year Students a thorough grounding in the subject in which they are most interested, each student in the Third Year is now required to select a subject, and write a detailed report or thesis on it, which will be handed in during the Midsummer Term. While specialization in the true sense is not possible at present, the fact that the Students in their Third Year are required to make such a report, will provide them with a more thorough knowledge of the subject of their choice. It is hoped in time that it may be possible to have the Third Year Students do some independent investigation of some of the problems of agriculture.

Student Tours in the Country.—During the year the Third Year Students made several visits to places of interest in the country, from which they derived a good deal of benefit. These trips were taken under the supervision of Mr. L. A. Powell, Agricultural Master at the Farm School.

On February 4th, the Class visited the property of Mr. G. R. Sharpe at Trout Hall and was shown over the citrus groves, the packing house and the canning factory. On the same day the Third Year Students visited the banana cultivation of Mr. Oscar Lord at Old Harbour. The Class visited the Jamaica Sugar Estates at Golden Grove on March 5th, and were shown over the Factory and plantations, and on October 10th they visited the Government Low Temperature Station in Kingston and were shown over the building and given instruction in the cold storage and shipment of vegetables. They were also shown over the vegetable plots. On November 12th, the Class visited several citrus groves in the St. Thomas in the

Vale District in company with Mr. C. S. Byles, the Agricultural Instructor for the District. Mr. Arthur McGrath's grazing pen at Minard, Brown's Town was visited on November 25th, and a visit was also made the same day to the Drax Hall Soap Factory, where the various processes in the manufacture of soap were explained.

I wish to take this opportunity of expressing my appreciation to those who so kindly facilitated the School by allowing the students to visit their places. The practical instruction received is very valuable to the students.

Experiment Station.—The Farm School Experiment Station consisting of four acres is now well established, and provides an excellent means for the Students to receive practical instruction in Field Crops of all kinds. The crops grown on the Station consist of citrus, bananas, coffee, pineapples, canes, cassava, sweet potatoes, tobacco and tomatoes.

Spraying with Emulso in an attempt to control Green Scale was carried out on the young citrus tree as well as the young plants in the nursery. Applications were made at three week intervals, and it was found that two applications, three times during the year, were sufficient to keep all the plants relatively clean of this pest.

A varietal experiment was conducted with tomatoes during the year with the following results:—

Variety.	Yield per 1/40th acre pounds.	Yield per acre pounds.
Crown Selected Marglobe ..	260	10,400
Crimson Cushion ..	245	9,800
Stone	254	10,160
Marglobe	228	9,120
Scarlet Topper	208	8,320
Ponderosa .. .	321	12,840

The tomato crop on the whole was very good and little trouble was encountered from disease.

A varietal experiment is also being conducted with bitter cassava. In this experiment the following varieties are being used:—White Stick, Bunch of Keys, Spanish Town, Blue Bud and Hanover. The growth obtained with this crop has been exceptionally good, and the experiment will be concluded during 1936 when the crop will be reaped.

The lack of a sufficient water supply has seriously handicapped those crops which are not drought resistant, and it is hoped that in the near future, better facilities in this connection will be provided in order that the work of the Station may produce the maximum results. Proper mulching with earth and straw have helped considerably in overcoming the insufficient water supply.

Having the Experiment Station near to the School has greatly facilitated the instruction in work with Crops, and the student are now able to spend considerably longer time at such work than was possible under the arrangements in the past.

Extension Work.—The Farm School is increasing in popularity as a place for holding of meetings in connection with agriculture. On January 14th and 15th the Annual Conference of the members of the Staff of the Department of Agriculture was held at the School. The lectures and discussions were held in the General Classroom at the School and lunch was provided in the Dining Room for those attending the Conference.

The Members of the Advisory Board of the Farm School inspected the School and Experiment Station on January 22nd, and were shown the work being done by the Students.

The School Empire Tour consisting of a number of boys from Schools in England, visited the School on March 5th during the tour of the West Indies.

The Farm School had an exhibit of work done by the Students at the All Island Show held at May Pen on Easter Monday. The exhibit included examples of the work done in Carpentering and Metal Work as well as examples of the work done in Crops and Livestock. Several students were present at the Show and gave assistance with the exhibit. Four members of the School Staff were present to explain the work, and give information concerning the Course offered at the School.

The Annual Summer Course of Lectures was held at the School from July 22nd to 26th, and was well attended. Facilities were made for those attending to obtain board and lodging at the School for the week, and the lectures were given in the General Classroom.

The Associated Branches of St. Andrew of the Jamaica Agricultural Society held their annual meeting at the School in December. Provision was made for them to use the Dining Room for lunch, and the lectures were held in the General Classroom.

A number of tour parties from the country visited the School during the year and were shown around. When necessary provision was made for them to have a picnic lunch on the grounds. It is hoped that a greater number of people will take advantage of this facility in future and pay the Institution a visit.

Health of the Students. The health of the students for the year was very good, no contagious disease was reported.

Sports.—The usual instruction in sports was carried out. The School entered a team in the Evelyn Cup Cricket Competition and tied for third place. A team was also entered in the Third Division Football League.

The Annual Sports Day of the School was held on Wednesday, March 27th. The attendance was larger than in previous years and all events were well contested. The students take a keen interest in this activity of the School. The Cup donated in 1934 by Mr. Arthur McGrath for Athletics was won by the Wortley House.

Student Christian Movement.—The Farm School Branch of the Student Christian Movement carried on a successful years work. Mr. B. Buxton who for many years was a missionary in Japan very kindly came to the School, and spoke to the Students. Again my thanks are due to Mr. E. B. Hallett of the Y.M.C.A. for his interest and supervision in this work.

Visitors to the School.—Besides those attending the various meetings held at the School a number of individuals visited the Institution. Among those who were shown over the place were Miss Miller of Idaho, U.S.A., Lord Loch, Suffolk, Mr. J. B. Sandford, Hants, England, Mr. Martin Charlesworth, Cambridge University, England, and many others.

Alterations made.—The Live Stock Records of the Government Stock Farm were moved to the Office of the School at the end of the year and the office of the Headmaster and Senior Assistant Master were moved to a room adjoining. This provides ample room now for all members of the Staff and alleviates some of the congestion.

Leave.—During the year I was away from the Island on Vacation Leave from April 14th to October 25th. While in England I attended the Royal Show and visited several agricultural institutions. I also took the general Agricultural Course at the University of Cambridge during July and August, studying under Dr. Hammond of the Department of Physiology. During my absence Mr. L. A. Powell acted as Headmaster.

Conclusion.—I wish to again express my sincere thanks to those who so kindly gave the School assistance during the year, and especially to the Staff of the Farm School and Stock Farm for their generous co-operation throughout the year.

J. W. Howe,
Headmaster.

(vi) *Report of the Farm Superintendent for the year ending 31st December, 1935.*

I have the honour to submit my Report for the year 31st December, 1935.

General.

The year on the whole, was not a good one for livestock on the Liguanea Plain. While the rainfall up to the end of October was normal, the rain stopped on October 26th, and from that time until the end of the year practically no rain fell. November, which under normal conditions is a month of heavy rains, proved very dry indeed, only 0.55 inches falling as compared with 11.60 inches during the same month of 1934. The lack of rainfall towards the end of the year seriously affected the pasture, and it was necessary to feed a larger amount of chopped cane to keep up the milk flow in the dairy herd.

The total rainfall for the year amounted to 53.72 inches as compared with 58.17 inches in 1934, while the monthly average for 1935 was 4.31 inches as compared with 4.58 in the previous year.

Throughout the first eight months of the year, pasture conditions were normal, and no serious lack of pasture was evident. With the sudden termination of the rainy season in October however, the pasture fell off rapidly, and a shortage was noticed.

The two storms in September and October, did little damage on the Farm, and the heavy rains which accompanied them, aided the growth of crops generally.

Livestock.

Numbers.—During the year there was an increase of 51 head in the number of livestock on the Farm. This number is made up of 50 head of cattle and 1 horse.

The total number of head of livestock on the Farm at the end of the year was 475, as compared with 424 in 1934. This number was made up as follows:—

	1935.	1934.
Bulls	27	23
Purebred cows and heifers	46	50
Grade cows and heifers	364	313
Mules	23	23
Horses	2	1
Steers	13	14
	475	424

Value of Livestock.—There was a decrease in the total value of the livestock on the Farm amounting to £486 17s. 0d. The value for 1935 was £7,607 13s. 0d. as compared with £8,194 10s. 0d. for 1934. The decrease is due mainly to the low prices of livestock in the Island, and the fact that with the adverse weather conditions which prevailed during the year, there was less demand for livestock generally. The condition of the livestock on the Farm during the year was uniformly good.

Calvings.—During the year under review, a total of 165 calves were dropped, which number was made up of 86 bull calves and 79 heifer calves. This is an increase of 8 calves over the previous year when 71 bull calves, and 86 heifer calves were dropped, a total of 157 head. The number of calves from the various sires were:—

Sire.	No. Bull Calves.	No. Heifer Calves.	Total.
1. Double Folly (Guernsey)	15	19	34
2. Foremost Monogram (Guernsey) ..	1	6	7
3. Hope Foremost 3rd (Guernsey)	10	8	18
4. Bess' Pussa (Montgomery-Guernsey) ..	1	1	2
5. Fon 70A (Jersey)	18	13	31
6. Hope Victor (Jersey)	7	3	10
7. Porpus (Montgomery-Jersey)	3	7	10
8. Stanley (Montgomery-Jersey)	3	2	5
9. Paymaster (Montgomery-Jesrsey) ..	2	1	3
10. Sanhiwal Pusa (Montgomery)	2	2	4
11. Sir Francey Romeo Posch (Holstein-Friesian)	7	7	14
12. The Mayor (Holstein-Friesian)	13	9	22
13. Unknown	4	1	5
	86	79	165

Deaths.—The total number of deaths in the herd for the year was 32, or one in excess of the number last year. The animals dying consisted of 1 bull, 6 cows, and 25 calves. The causes of deaths were as follows:—

Bulls.—		
Old Age	1	1
Cows.—		
Parturition trouble	2	
Pneumonia ..	2	
Womb trouble	1	
Emaciation	1	6
Calves.—		
Slaughtered for veal ..	7	
Born dead	7	
Weak at birth	1	
Uremic Coma	1	
Broken leg (destroyed) ..	1	
Pneumonia	3	
Scours	1	
Inflamation of the kidneys ..	1	
Emaciation	2	
Nervous disorder	1	25

Disease.—There was no serious outbreak of disease in the herd with the exception of tuberculosis, which will be dealt with under a separate head. The general health of the animals in the herd was good and the deaths which occurred, were such as might be expected, in a herd of the size of the one at the Farm.

Tuberculosis.—The incidence of tuberculosis in the herd this year was much higher than in former years, a total of 26 animals reacting to the two tests which were made in July and November. I am at a loss to account for the increase in the number of reactors, and with the co-operation of the Government Veterinary Surgeon I am making enquiries into every possible source of infection. The herd has been relatively free from the disease in recent years, and it is most unfortunate that the number of reactors has shown a large increase over the year. In all cases the animals reacting were slaughtered.

In the test for tuberculosis made on the herd in June, five animals reacted, and in the test made in November, twenty-one head reacted.

All the stalls and pens on the Farm were immediately disinfected, and all the water troughs drained and throughly cleaned, with a strong disinfectant. The stalls and pens were disinfected by means of a gasolene blow torch, in order to clean out all corners and crevices.

Importations.—No importations for the Stock Farm were made during the year. An Aberdeen Angus bull was imported for Grove Place however, and landed at the Farm on December 19th. This bull will be kept at the Farm until it has become acclimatized, when it will be sent to Grove Place where it will stand for service.

Purchase of Live Stock.—Only one purchase was made during the year when a gelding, Sir Gerald, was purchased for riding purposes on the Farm.

Sales of Livestock.—A total of 82 head of cattle were sold to the public during the year. This number includes 29 head sold to the butcher for slaughter, 52 bull calves and one yearling bull.

Sales to the butcher were as follows:—

Non-breeders ..	8 cows
Old Age	3 cows
Reactors to T. B. test ..	10 (7 cows and 3 bulkins)
Calves	8

Sales of bull calves to the Public for breeding purposes totalled 52 head. The number sold of each breed was:—

Grade Jersey ..	23 head
Grade Gernsey ..	13 "
Grade Holstein ..	13 "
Purebred Jersey ..	3 "

One yearling Montgomery-Brown Swiss bull was also sold during the year.

The demand for bull calves was only fair, and six calves had to be slaughtered for veal, due to the fact that no sale for them could be found.

Milk Production.

Yield.—The milk production of the herd during the year reached the record of 267,429.75 quarts, the highest since the Farm has been in operation, and an increase over last year of 12,981 quarts. The total yield of milk at the Farm has been steadily increasing over the past number of years as the following figures will show:—

Year.	Yield.
1935	267,429.75 quarts.
1934	254,448.90 "
1933	236,391.00 "
1932	222,923.00 "
1931	207,502.50 "

The increase is due primarily to the increase in the number of cows in the herd, but more perhaps to the increase in the production per cow and better feeding conditions.

Milk Sales.—The milk sales increased by 13,231.50 quarts over 1934 with the total sale for 1935 amounting to 210,202.75 quarts. The following are the milk sale figures for the past four years—

Year.	Sales.
1935	210,202.75 quarts.
1934	196,971.25 "
1933	198,913.25 "
1932	186,924.50 "
1931	153,300.00 "

The Farm was able to supply the requisitions for milk from the Public Institutions, except during that part of the year when pasture was scarce. The lack of pasture very seriously affects the production of milk from the herd, and it is not possible to maintain production despite the fact that cane or silage is being fed.

The following figures show the averages in connection with the production of milk for the last three years:—

Year.	Average No. cows Milking.	Average daily Production per cow quarts.	Average daily yield for the herd.	Average butter fat content %.
1935	140	5.20	732.6	5.00
1934	135	5.16	697.1	5.22
1933	132	4.90	648.6	5.58
1932	106	5.70	608.6	5.32
1931	102	5.57	568.5	5.31

From the above figures it will be noted that the average production per cow increased slightly over the previous year, while the herd average also increased. The number in the herd increased by eight cows, which does not compensate for the increase in the daily average production, showing that the cattle in the herd gave a higher average production than in the year previous. The figures of individual production include cows in all stages of the lactation period, and will therefore include cows just freshening as well as those drying off.

It will be noted that the average percentage of butterfat in the milk dropped slightly over the previous year. This is due to the large number of Holstein Friesian in the herd. It might be pointed out however that the figure of 5.0% for the butterfat content of the milk is considerably higher than average. Animals. with Zebu blood usually produce a richer milk than that produced by the northern breeds of cattle.

Butter.—The total amount of butter made for the year was 2,906.1 pounds, a decrease of 976.9 pounds The decrease was due mainly to the increase in the requisitions for milk. All the butter made was sold to the Mental Hospital.

The amount of milk used for 2,906.1 pounds of butter was 22,131 quarts, which works out at the rate of 7.62 quarts or 19.8 pounds of milk to the pound of butter.

It has been found that in order to make a high quality product some form of cooling must be used. At the Farm ice is used, and the butter is washed with cold water, which not only greatly facilitates the working, but also makes it easier to rid the butter of the butter milk, which results in a higher quality product.

Public Stud Services.

General.—Owing to public request, a public stud for cows was established at the Farm in August, 1934. Two bulls, one of the Jersey and one of the Guernsey breed were stationed for service. The services were as follows for the year:—

Guernsey	Jersey.	Total.
19	39	58

The fee charged is 6s., with twenty-four hours free pasture, after which time the pasture rate is two shillings and six-pence per day.

Bulls stationed for Service.—The Guernsey bull which was stationed for service during the year was *Hope Foremost 3rd.* The sire of this animal was *Foremost Monogram* and the dam was *Cora of Hope.* The Jersey bull stationed for service was *Hope Victor*, whose sire was the Jersey bull *Sophie 19th Victor*, and his dam *Merridale Perfection.* The number of animals coming to these bulls has been fair, and the number will no doubt increase as the service becomes better known.

The stud fees received for the year amounted to £17 8s. 0d.

Poultry.

Sales.—The Farm now has two breeds of poultry. The utility breed raised is the Rhode Island Red while the egg breed raised is the White Leghorn.

The demand for breeding stock from the Farm Flock was maintained during the year as the following figures show.

	Rhode Island Red.	White Leghorn.
Eggs sold for hatching	161	
Baby chickens sold	136	
Cockerels sold for breeding ..	11	3
Hens sold for breeding ..	22	

Beside the above sales for breeding purposes, the Farm sold 2,892 eggs for table purposes. Thirty-two head of hens, cockerels and roosters were culled from the flock, and sold for table purposes.

Breeding Program.

Breeding Program.—The usual breeding program has been carried out throughout the year. It is to concentrate the blood of *Pusa* the old Montgomery bull which died during the year, and to cross his progeny on the animals of the northern breeds mainly Jersey and Guernsey, in an attempt to produce a breed which will give a good flow of milk yet be resistant to tropical conditions. So far such work has been quite successful, and there are now enough animals of the above breeding on the Farm to allow for some selection. In the very near future it will be determined whether or not such a cross will breed true, and what characteristics are dominant and which are not. While it will take many years of breeding to establish a new breed, the ground work has already been done and so far the results have been very satisfactory.

Record Yields.

Record Yields.—During the year under review two outstanding cows were developed at the Farm and created records for milk production. They are *Nancy*, a grade Holstein and *Meadow* a Montgomery-Jersey.

Nancy created what is thought to be a record for the West Indies, by producing between December 2nd, 1934, and December 31st, 1935 a total of 11,199.6 pounds of milk. This cow produced a maximum of 75.8 pounds of milk or 29.2 quarts in one day. *Nancy* is a four year old and is sired by *Sir Francey Romeo Posch*, the Holstein herd sire at the Farm.

Another high producing cow during the year was *Meadow*, a Montgomery-Jersey. This cow in 365 days produced 7,629.9 pounds of milk and at her maximum yielded 16.9 quarts in one day. This cow is now 12 years old, and is still in excellent condition.

While the above figures for yield are not high when compared with records made in a colder climate such as England, Canada, and the United States, they are high for production under tropical condition and do show that high producing cows can be produced in Jamaica, and elsewhere if proper attention is paid to breeding, feeding and management. The figures definitely show that it is possible to raise a 1,000 gallon cow under tropical conditions.

Crops.

Guinea Corn Silage.—A total acreage of 58 acres was put into guinea corn during the year. Due to the uneven distribution of the rainfall, this year, the crop was much inferior to former years both in tonnage and quality. The growth was much less than last year and the leaves of the corn low on the stalk withered with the dry weather. The tonnage was however enough to fill the silos, and provide sufficient silage to last until next season.

Sugar Cane.—The sugar cane on the Farm did well as facilities are provided for irrigation. The patch of Uba cane near the main dairy buildings was especially good, and provided the necessary roughage at the end of the year when the dry weather had practically destroyed the guinea grass pastures.

Mangoes.—The mango crop this year was larger than the previous year, and a larger consignment of this fruit was shipped to England. The selection of the fruit for export was done at the Farm and the work of packing and shipping was done by the Low Temperature Station, and the results were most satisfactory. Enough information regarding the best way to pack, the proper shipping temperature, etc. has been obtained to reduce the shipping loss considerably, and the fruit now arrives in excellent condition. Many trees do not bear a crop regularly and the size of the crop here varies considerably. Weather conditions also have a very great influence on the crop.

Re-afforestation.—An attempt was made to re-afforest the Liguanea Ridge, but owing to the rainy season being short, and finishing in October, the work did not meet with a great deal of success. Seeds of all the trees on the property are however being collected, and will be planted on the Ridge as soon as weather conditions prove favourable. Notice was given to the tenants along the Ridge that they had to move off the land, and it is hoped that by having this area free from tenants trouble from fires will be greatly reduced.

Buildings and Improvements.

Feed Room.—A reinforced concrete feed room was constructed during the year. The building measures 21 feet by 42 feet and is so built that it can, when necessary, be made practically air tight for proper fumigation. The loss of feed in former years due to bad storage conditions was high, and this loss will, it is hoped be reduced by the construction of such a building. The building is divided into two parts. The main portion which takes up about two-thirds of the floor area, is used for storing the feed in bulk, from which it is issued and mixed once a week. By means of a partition a smaller room is provided in which the various feed mixtures are kept and issued for use.

The building is located near the silos so that the concentrated feed can be issued when the roughage is being prepared, thus saving labour. The building was constructed by Farm labour.

Live Stock Foreman's Cottage.—A house consisting of five rooms with the necessary outbuildings was erected for the Live Stock Foreman. This building is a decided asset to the Farm and enables the Foreman to live on the property with his family. The work required for the construction of this building was done entirely by labour on the Farm.

Store Room.—With the construction of a new feed room, the old room which was used for feed storage converted into a general store, and it is now possible to keep all the tools and equipment in this building, instead of having it in several places as formally. Having such equipment so stored also aids materially in keeping a check on the supplies.

Removal of Records from Head Office to Farm School.—During December the livestock records of the Farm were moved to the Office of the Farm Superintendent at the School. The office was enlarged to facilitate an addition to the Staff and the records, and in future all the record work of the Farm including sales of live stockwill be carried on at this office. Having the records here assists in the supervision of the work on the Farm.

Dairy Building.—An additional water system was provided in the main dairy buildings, and taps provided for the washing of the cows previous to milking. The installation of such a system aids not only in improving the cleanliness of the animals before milking but also saves labour.

General Repairs.—Repairs to the buildings and fences on the Farm were carried out during the year.

Extension Work.

Exhibit at May Pen Show.—An exhibit of livestock as well as an exhibit along educational lines was entered by the Farm, at the All Island Show held at May Pen on Easter Monday, April 22nd. The livestock exhibited consisted of one Jersey-Montgomery bull, and seven cows which were good representatives of the breeds raised on the Farm. An exhibit of feeds used on the Farm was also made and information regarding the proper feeding, breeding and management of livestock was given. Mr. Redshaw was in attendance during the time the exhibit was at the Show, and on the day of the Show several of the Farm School Staff under Mr. L. A. Powell were present to give information regarding the exhibit.

Meetings held at the Farm.—In January the Annual Staff Conference of the Department was held, and the members present were shown over the Farm. In July the Annual Summer Course of Lectures was given at the Farm School. Those present were shown over the Farm and several practical classes in livestock work were given.

Visitors.—A number of people visited the Farm during the year. Among those who registered were the members of the School Empire Tour, 18 in number, Mr. Martin Charlesworth, Cambridge; Mr. P. F. Kerr-Jarrett, Montego Bay; Mr. V. C. Troup, Winchester, England; Mr. H. C. Crouch, Ascot, England; His Excellency the Governor; Mr. F. L. Brown, Assistant Colonial Secretary; Hon. C. C. Woolley, Colonial Secretary; Mr. Nicholson, Director of Agriculture, Middlesex, England, and several others.

Conclusion.

Leave.—I was away from the Island on leave from April 14th to October 25th. During my absence Mr. L. A. Powell acted as Farm Superintendent.

Staff.—During the year Mr. L. S. Marston was engaged as Stock Farm Clerk and is now in charge of of the Records and Stores on the Farm.

I wish to express my appreciation for the way the work was carried on during my absence, and for the co-operation and assistance rendered not only by the Staff of the Stock Farm and Farm School, but also from the other branches of the Department.

J. W. Howe,
Farm Superintendent.

Summary of Figures Concerning Government Stock Farm, 1935.

1. *Cattle on the Farm.*

Bulls.—		
Imported Bulls	5	
Pure Bred Native	13	
Grade Native	9	27
Purebred Cows and Heifers.—		
Jerseys	14	
Guernsey	9	
Red Poll	22	
Brown Swiss	1	46
Grade Cows and Heifers.—		
Jersey	104	
Guernsey	134	
Holstein	65	
Montgomery	26	
Brown Swiss	15	
Red Poll	8	
Ayrshire	4	
Native	3	
Outsiders	5	364
Working Stock.—		
Mules	23	
Horses	2	
Steers	13	38
Grand Total at December 31st 1935.		475 head.

2. *Calvings.*

Total. 165. Bull Calves 86, Heifer Calves 79 head.
The calves were sired by the following bulls:—

Double Folly	15 Bull Calves	19 Heifer Calves
Fon 70A	18 " "	13 " "
The Mayor	13 " "	9 " "
Hope Foremost 3rd	10 " "	8 " "
Sir Francey Romeo Posch	7 " "	7 " "
Porpus	3 " "	7 " "
Hope Victor	7 " "	3 " "
Foremost Monogram	1 " "	6 " "
Stanley	3 " "	2 " "
Sanhiwal Pusa	2 " "	2 " "
Paymaster	2 " "	1 " "
Bess' Pusa	1 " "	1 " "
Unknown	4 " "	1 " "
	86 " "	79 " "

3. *Milking Herd.*

1st Calvers	43 head
2 "	21 "
3 "	25 "
4 "	18 "
5 "	13 "
6 "	12 "
7 "	5 "
8 "	4 "
10 "	1 "
11 "	1 "

4. *Stock sold to Butcher.*

29 head. 18 cows, 3 bulkins, 8 calves.

Nonbreeders	8 cows
Old Age	3 cows
Reacted to T.B. test	10 (7 cows, 3 bulkins)

5. *Bull Calves sold to Public.*

52 head.

Grade Jersey	23 head
Grade Guernsey	13 "
Grade Holstein	13 "
Pure Bred Jersey	3 "
	52 "

6. *Yearling Bulls sold.*

1 head.

Montgomery Brown Swiss	1 head.

7. *Deaths.*

Total 32 head—1 bull, 6 cows, 25 calves.

8. *Public Stud Pen.*

Total of 58 cows to the bulls. Jersey Bull 39 cows, Guernsey Bull, 19 cows.

9. *Feed purchased for Stock.*

Canes	676.5	tons (Grown)
Cottonseed Meal	500	bags (purchased)
Linseed Meal	150	" "
Bran	300	" "
Coconut Meal	86	tons "
Milk Powder	7.5	tons "
Rock Salt	32	bags "

10. *Milk.*

Yield	267,429.75 qts.
Sales	210,202.75 qts.
Highest Monthly Production—August	24,924.75 qts.
Lowest Monthly Production—January	18,988.75 qts.
Highest Daily Production—26th August	928 qts.
Lowest Daily Production—30th January	549 qts.
Highest No. Cows Milked per Day 17th February	152 cows.
Lowest No. Cows Milk per Day 15th June	130 cows
Highest Daily Yield for Cow May 4th	60.5 pounds
Highest Yearly Yield for Cow Nancy (2.12.34. to 31.12.35)	11,199.6 pounds
Average fat content of milk (Sample taken weekly)	5.08% fat

The milk yield shows an increase of 12,981.75 quarts over the previous year. The sales show an increase of 14,085.5 quarts over the previous year.

(vii) *Report of Superintendent Grove Place Stud Farm and Experimental Station.*

A. WEATHER.

It is pleasing to report that Grove Place is living down its reputation for dry weather. In 1935 there was a precipitation of 89.11 inches of rain over 107 days. 11.96 inches were recorded in the first three months of the year, the proverbial dry period in this section of the Island. The average fall for the previous five years, excluding the flood year of 1933, was 74.15 inches.

This splendid agricultural weather was offset by a storm (on the 27th of September) which resulted in much damage to the Experimental Station. The banana plots were completely destroyed and the manurial experiment on this crop reduced to nullity as a consequence. Coffee also suffered serious mechanical damage from falling shade trees at the time and from subsequent exposure.

The long range in temperature in the early months of the year had serious re-action on the incidence of blight on potato in the district.

B. CROPS.

1. *Citrus.*—The grove of grapefruit laid out on section A of the Station in 1932 came into bearing for the first time. 315 boxes of grapefruit and 338 boxes of orange were reaped and sold for a cash return of £38 15s. 4d. A small grove of Navel Orange also came into first bearing.

Plots of sixteen acres of Marsh Grapefruit for a manurial experiment, eight acres of Pasrson Brown and Valencia Orange, and a collection of all available varieties, were surveyed and planted with plants supplied from the nurseries at Spanish Town.

Recently established citrus at Grove Place consists of:

Grapefruit:	8 plots	1914 plants.
Orange	3 plots	848 plants.

Budded plants were available from the nursery for sale to the public; the following were supplied:

Marsh Grapefruit: 1,850 budded plants.
Parson Brown, Valencia and Navel Orange: 536 budded plants.

2,060 buds were distributed to 36 persons.

2. *Coffee.*—The plot established on section A in 1932 came into heavy bearing. Due to the failure of the two varieties of *Bois immortel* used as experiments for shade trees the plot went down to die back. Further damage resulted from the hurricane and eventually the majority of trees were cut back.

A quick-growing tree, suitable for coffee shading is badly needed: Bracatinga, Otaheite Apple and Guango are now under trial.

A crop of 725 lb. was reaped, cured and sold for the low price of 29/- per hundred pounds.

A coffee nursery with suitable shade-stands has been established, and an attempt, which appears to be both promising and practical, has been made to offset the high loss in seedlings by growing them in small basket ready for planting in the field. The cost of the baskets is the limiting factor but this has been brought down to three farthings each.

Large lots of ordinary seedlings were distributed free of charge.

3. *Banana.*—Unfortunately the storm of September destroyed both banana plots. Up to this time reapings from the experimental plot, nine-tenths of an acre, showed 184 nines, 87 eights, 29 sevens, 6 blown down, for a cash sale of £38 14s.

Data from the experiment will be published in due course.

Work in banana at Grove Place has been directed to the conservation of water by the contiuous use of a leguminous cover (Overlook Beans) in place of the heavy expensive bush mulch in common use, and the application of fertilizers. The effect of this work has been most encouraging. Numerous basins in the parish, hitherto unproductive to a cash crop, has been brought into cultivation, and Bengal Beans as a cover has come into common usage.

4. *Pimento.*—"Rust" has hit this crop a serious blow all over Manchester and Grove Place in particular. No crop was reaped during the year and most of the trees are now dead.

5. *Cane.*—Five acres of Uba has produced fodder for cattle and pigs, and a small varietal plot of B417, P.O.J. 2878 and E.K. 28 has been in healthy production despite the belief that cane will not "do" in these parts.

Dairymen are now however planting Uba for fodder, while small proprietors, grow other varieties for human consumption. Sugar cane is regarded as a delicacy in Manchester, individual cane selling for as much as a penny-half-peny each with a big demand. Cuttings of the varieties have been distributed.

6. *Fodder Crops.*—The plots of Alfalfa and Berseem (Egyptian Clover) have been so promising, both on production and analyses, that an adequate supply of seeds has been imported for large-scale planting.

Five varieties of clover were tried out. Of these, a white clover, No. 5, appears to be the most promising.

Five acres of guinea corn was grown for making ensilage.

7. *Papaya.*—Continuous heavy crops of papaw have been produced on a varietal plot of truncated trees which remained entirely free of mosaic. No sales were made there being little demand for the fruit, but trial shipments have been made to Kingston and Montego Bay.

8. *Potatoes.*—The 4th, 5th and 6th series of experiments for the Jamaica Agricultural Society were continued throughout the year and valuable data collected. Series Number 4 comprised a manurial experiment involving six varieties and the use of N. P. and K alone and in various combinations with and without pen manure.

The 5th series was purely cultural; the 6th, an out-of-season experiment.

This is a crop which is full of possibilities for this section of the Island. In 1934 over 1½ million lb. of this highly protected article was imported, and at the time of greatest demand, no local potato was available the imported article being retailed at about 12/6 per bushel.

The indications are that:

i. local cultural technique is faulty, the crop requiring as it does persistent and regular cultivation, being totally unsuited to the temperament and implements of cultivators who are used to the casual methods well adapted to root crops and bananas.

ii. varieties more highly resistant to "blight" are needed.

iii. storage possibilities should be examined.

9. *Cover Crops.*—The following "Covers" are now well established in plots and under permanent crops: *Crotalaria usaramoensis, Tephrosia vogelli* and *candida, Centrosema pubescens, Indigofera endecaphylla,* Beggar Weed, Bengal Bean, Over-look Bean, Jerusalem Peas, Pigeon Peas.

10. *Vegetables.*—Plots of the following have been grown for the Low Temperature Station:

(a) *Tomatoes.*—Three and two-thirds squares of five varieties (Kondine Red, Potentate, Riverside, Sunrise and Alisa Craig) were grown under heavy mulch, without water from the time of setting out, and 6,705½ lbs. of fruit produced of which 3,923 lbs. were shipped.

(b) *Egg Plant.*—Three varieties have been grown on 3¾ squares and are now in bearing, 1,262 lb. having been produced and 941 lbs. shipped.

(c) *Pepper.*—Three varieties have been grown on 3 squares and so far produced 1,116 lbs. of fruit of which 903 lbs. have been shipped.

Peppers and Egg Plants are still being reaped at the time of writing.

11. *Other Crops.*—Root crops, vegetables, corn, pine and peas were grown for purposes of Agricultural Education.

12. *Bitter Damsel Nursery.*—A nursery, financed by the Jamaica Match Company, was established: 10,000 seedlings in bamboo pots will be ready for distribution in the Spring of 1936.

13. *Experiment Station—General.*—The various sections have been fully maintained during the year. Section A was extended to include the Damsel and Coffee nurseries, and a water supply, pumped from a "catchment" well, laid on. In addition to routine operations many projects have been initiated and carried through: e.g.:

i. Composting manure.
ii. Fertilizing pastures.
iii. Decomposition of various Green Manure.

The station proved of continuous interest to agriculturists from all over the Island.

C. LIVE STOCK.

1. *Cattle.*—The progress of grading up the dairy herd received a severe set back by the death during the year of 17 excellent heifers in high condition and in calf. It is presumed that full reference will be made to this matter by the Government Veterinary Surgeon in his report. Heifers apparently quite healthy and normal one day would be found dead on the following morning from chronic impaction. As the animals were then on good spring grass the situation was difficult to understand. Anthrax was suspected, a provisional quarantine imposed, and all animals immunized. The suspicion of anthrax was not confirmed. I am pleased to be able to report that the trouble has been brought under control the last death being on the 19th September.

It is obvious that it is not feasible to expect the high grade herd which now obtains on the farm to exist under the range conditions which were suited to the hard, athletic high Indian cattle from which the grading up began; that is, the golden rule of making conditions keep pace with improvement of herd has not, for financial reasons, been observed.

All animals were presented to the valuator in December. The figures show a decline due to the:

i. high death rate.
ii. low price of stock.
iii. new policy of depreciation of high priced stud animals.

Breeding improvement is reflected in the fact that despite low prices the valuation per head of heifers increased from £4 19s. to £5 5s.

The total valuation was £1,889 10s. compared with £2,089 16s. 4d. for the previous 5 year average.

2. *Mane Stock.*—As a result of depasturing mares on the higher reaches of the property these animals have shown marked improvement.

The stallion "Snow Boy" has been healthy throughout the year.

The stallion "Order" (Star-and-Garter-Welsh Horse) was leased from Mr. Harold Bolton for one year and put to the stud, but he was not well patronized.

Kentucky Boy, the old Jack, was superannuated and destroyed after 16 years at the stud.

The Farm continues to produce mules of outstanding quality. Two were broken to draught and one to saddle.

3. *Pigs.*—Pig service has remained popular and the demand for young boars is still greater than the Farm can supply for a long time. The imported boar Richings Bon Concord died at the May Pen Show, but as he was insured and had been at the stud for 3 years, and as the Farm has another unrelated boar as well as a young boar sired by the imported boar, the loss is not felt except in so far as it is reflected in the valuation figures.

4. *Sheep.*—Sheep service continues to be a speculative venture on the Farm although penkeepers report improvement in their flock as a result of the influence of the progeny of the ram Tendring Token. This animal kept indifferent health during the year.

5. *Stud Service.*—This service was fully maintained throughout the year.

Due to the unfavourable outlook for dairy products in Manchester local patronage of stud bulls was poor, but supplementary funds had to be obtained for subsidizing transportation of cows from other parishes. A total of 158 cows from 31 owners were received for service.

Animals at the stud were:

i. Mane Stock.	Stallion	Snow Boy Order
	Jack	Kentucky Boy Senator Owen
ii. Cattle	Bulls	Leonie's True Lad (Red Poll) Etta's Pogis, Glen's Prefect } Jerseys Hope Foremost 5th (Guernsey) Cortes (Mont.-Guernsey) Porpus (Mont.-Jersey) Justice (Mont.-Brown Swiss)
iii. Pigs.	Boars.	Richings Bon Concord, Grove Marquis, Grove Viscount } Berkshires.
iv. Sheep	Ram	Tendring Token

6. The following tables show the Live Stock at Grove Place in December, with their valuation, service records, births, sales and deaths for the year.

TABLE 1.

Live Stock and Valuation.

	Cattle.					Other Stock			Bees.	Totals.
	Bulls & B.C.	Cows.	Grade Heifers.	CC. 1935.	Steers	Horse-kind.	Pigs.	Sheep.		
No. ..	9	63	50	15	4	32	9	3		
Valuation	£162	573	272	30	78	651	79	29 10/-	15	£1,889 10/-

TABLE II.

Services 1935.

	Mares to Stallion.	Mares to Jack.	Jennets to Jack.	Cows.	Sheep.	Sows.
Farm ..	5	2	2	91	3	5
Visiting ..	34	14	1	67	19	46
Totals ..	39	16	3	158	22	51

TABLE III.

Births 1935.

	Foals.			Calves.		Pigs.		Lambs.	
	Colts.	Fillies.	Mule Cubs.	B.C.	C.C.	Boars.	Shotes.	Ram.	Ewe.
No. ..	2	Nil.	1	15	16	11	8	1	nil.

TABLE IV.

Sales 1935.

	Colt.	Boars.	Shotes.	Draught Cattle.	Calves.	Total.
No. ..	1	10	5	10	21	
Price ..	£5	20	5	73 10 0	13 5 0	£116 15 0

TABLE V.

Obituary List.

	Cows and Heifers.	Bull.	Calves.	Mule.	Lambs.	Jack (destroyed).	Cub (destroyed)
No. ..	18	1	4	1	2	1	1

D. AGRICULTURAL EDUCATION.

Three six-week periods for practical work for Farm School students were held when two separate batches of 14 students were in residence.

Routine work of the farm, lectures and demonstrations were undertaken, and in addition Field Days involving visits to properties, estates and districts were observed.

E. DEMONSTRATIONS, LECTURES, FIELD DAYS, ETC.

One attractive feature of the year's work has been the observation of a series of Demonstration and Field Days.

i. A highly successful Citrus Field Day was organised and carried through on the 7th of December when agriculturists from all over the Island spent a whole day at Grove Place and received practical demonstration in various phases of Citrus culture from the seed bed to the reaping of the fruit. The proceedings were opened by His Excellency the Governor.

ii. The following Branches, Branches Associated and Schools visited in organised parties spending the whole day at Grove Place when demonstrations and lectures were given: Comfort Hall, Mile Gully, St. Andrew, Manchester Branches Associated, Frankfield Branch, St. Elizabeth Branches Associated, Ebenezer Branch, Northern St. Mary Teachers, Ginger Hill Branch, Little London School, Mid-Clarendon Branches, Manchester Dairymen.

iii. Lectures were delivered at the Manchester Branches Associated and the Manchester Loan Bank. The Farm participated in the May Pen Show when the Superintendent acted as judge.

iv. The services of the staff have been on steady call to property owners large and small for assistance of various kind. Help in castration, testing dipping tanks, illness of animals, lining and planting out citrus was rendered on 15 occasions.

F. IMPROVEMENTS AND REPAIRS.

i. Steady improvement to the property has been effected. A start has been made with regard to bringing the back lands under pasture condition by clearing, fencing and provision of water.

ii. A building for housing Agricultural Assistants was erected.

iii. The 3,000 gallon drinking trough in the dipping pen was reconstructed.

G. STAFF.

i. The staff has been strengthened by the appointment of two Agricultural Assistants specifically for the Citrus Experimental project.

ii. I was absent on an official visit to the Imperial College of Tropical Agriculture in Trinidad from the 25th of January to the 3rd of March.

iii. I was appointed Secretary of the Commission on the Lands and Survey Department and acted in this capacity, in addition to my normal duties, from the 16th May to the 6th September.

iv. I have also been engaged in the inspection of properties proposed for Land Settlement. Five such properties were visited and reported on and a special report was made on the Sisal Factory at Lititz.

v. The loyal co-operation of the staff is recorded and especially the services of the Superintendent of Stock who carried on during my absence.

GENERAL.

Grove Place continues to increase in popular favour and in consequence the work is growing by leaps and bounds. As an indication 386 persons, other than those on specific business and in organised parties visited during the year and 1,087 letters were received and 1,971 despatched.

Development of the Farm activities has rendered the water supply inadequate, and the safety margin of this supply is further reduced by the leaky condition of two main tanks. Even without the demand for the projected dairy development the water supply calls for early attention

Another aspect is that building accommodation has also become inadequate, and if the Farm is to function efficiently some action should be taken with regard to this matter.

ARTHUR THELWELL,
Agricultural Superintendent.

(viii) *Report of Government Veterinary Surgeon for Year* 1935.

GENERAL REMARKS.

1; As may be seen from the Weather Report of the year, the general weather conditions of 1935 in relation to grazing and fodder for livestock were not as a favourable as in 1934. The mean rainfall for the whole Island was 71.13 inches—2.74 inches below the 60-year average, while in 1934 the mean total fall was 79.82 inches—5.95 inches in excess of the 60-year average. In the first six months the rainfall was 26% below the average (indicating protracted drought in large areas), but in the second six months it was 12% above the average.

The total fall for the year was below the 10-year average in all the parishes, except St. Andrew, St. Thomas, Portland and Westmoreland, where the 10-year average was exceeded.

The mean of rainy days was 119, less by 3 days than the 35-year average of 122 days, and 20 days less than the 139 rainy days of 1934. The mean rainfall per rainy days was 0.60 inches as against 0.57 inches in 1934.

Severe and protracted drought with its ill effects upon livestock was experienced generally in St. Ann, St. Elizabeth and St. Catherine, and local areas of Trelawny and Hanover and Clarendon were also adversely affected. In all these six parishes the total rainfall for the year was approximately from $5\frac{1}{2}$—12 inches below their respective 10-year average.

2. (i) The general depression in the meat and dairy industries of the previous two years continued have its effect during 1935, owing to a surplus of *off-type* butcher stock, slow sale of meat even at low prices on account of general unemployment, and lack of facilities for making meat more constantly and generally available to the people, especially in the small towns and country parts.

(ii) The Beef Industry Committee appointed in 1934 reported in June, 1935 and its recommendations for the encouragement of more general consumption of meat with better regulation of butchering and methods of distribution and sale are being investigated.

(iii) The Dairy Industry Committee of 1934 reported in July, 1935 and recommended among many other things, Government aid in production of butter and the breeding of more dairy-type cattle.

(iv) Foreign competition.

Both these industries continue to feel the competitive pressure of imported meat and dairy products.

The Trade Report of the Colony for 1935 shows the following importations of animal food products at a rated valuation.

(a) Importation.

Article.	Quantities.		Value (c.i.f.)	
Meat.	1934.	1935.	1934.	1935.
	lbs.	lbs.	£	£
Beef—wet salted	1,294,760	1,328,398	18,301	22,872
Ham ..	373,914	393,062	15,405	21,653
Pork—wet salted	1,314,872	820,264	18,822	19,236
Milk, Condensed	6,933,659	6,791,045	112,296	104,114
Butter ..	1,116,743	1,078,236	38,394	39,037
Butter Substitutes	613,242	838,125	11,746	14,247
Cheese ..	563,360	593,570	16,461	17,781
Lard and Substitutes	1,013,002	1,030,584	17,342	19,006
Total all products	13,223,552	12,873,284	248,767	257,946
Total Meat Products excluding lard and its substitutes	2,983,546	2,541,724	52,528	63,761
Total Dairy Products excluding butter substitutes	8,613,762	8,462,851	167,151	160,932

(b) Exportation and Domestic Consumption.

The only available figures dealing with the local consumption of meat of domestic origin and exported animal products (hides, skins) are as follows:—

Article.	1934.	1935.	Value. 1934.	1935.
Cattle slaughtered in Island for local consumption	32,559	34,583	£211,634 (personal estimate at £6 10s.)	£225,790
Market milk—estimated (locally produced at 1/- per gal.) ..	galls. 500,000	galls. 500,000	£25,000	£25,000
Butter (locally made) (estimated at 1/- per lb.)	lbs. 120,000	lbs. 120,000	£6,000	£6,000
Hides (exported)	19,826	20,405	£9,158	£9,458
Goat skins (exported)	180,152	189,427	£13,121	£14,398
Total Valuation			£264,913	£280,646

These figures, however, do not fully represent the total number or value of livestock slaughtered for domestic consumption, because there are no returns for sheep, goats, and swine (the last two butchered in large numbers) nor hides tanned and sold locally. Most of the goatskins are exported, as there is virtually no local market for the leather.

(c) Comparison of valuation of imported animal products (meat with its bye-products and dairy articles and their substitutes or mixtures) with those produced and consumed locally (not including hides and skins exported), shows:—

Imported Article.		Domestic Article.	
1934.	1935.	1934.	1935.
Meat £69,870	£82,767	£211,634	£225,790
Dairy products (condensed milk, butter substitutes) £178,897	£175,179	Market milk—estimated at 500,000 galls at 1/- per gall. £25,000	£25,000
		Butter—estimated at 120,000 lbs at 1/- per lb. £6,000	£6,000
£248,767	£257,946	£242,634	£256,790

The comparison indicates the large local market available for home-produced and manufactured animal products (especially dairy), provided the interests concerned can successfully meet foreign competitive quality of goods and prices.

3. Foreign outlet for livestock and meat etc. (other than hides and skins).

(i) Investigations along these lines by commercial bodies have so far not been successful nor encouraging in a general way. No export of meat, either on hoof or as dressed carcasses, has been established other than supplies to the stores of calling steamships.

(ii) Export of animals for breeding or commercial purposes.

Stud animals.—

2 Thoroughbred stallions to British Honduras.
4 Jacks to British Honduras.
11 Red Poll cattle (1 bull, 10 heifers) to Spanish Honduras.
3 Mysore bulls to Ecuador, South America.

Transportation purposes.—

150 pack mules to Republic of Panama.

These exportations, though small, suggest as indicated in previous reports, the possibility of Jamaica as—

(a) a distributing centre of improved and tropically acclimatized horses and cattle for stud purposes to Central American countries, other West Indian Islands and the northern portion of South America;

(b) a source for mules for draft and pack transportation in the same countries.

4. Importation of Stud Livestock.

Due to the general depression and unsettled condition of both the local meat and dairy business, fewer stud animals were imported in the year than usual.

The importations were:—

Stallions (exclusive of race horses) and jacks. Nil.

Cattle: 2 Aberdeen Angus bulls from U.S.A.—one for Department of Agriculture, one by private owner.
1 Hereford bull } both from England—private ownership.
1 Shorthorn bull }

5. 6 Suffolk Sheep (1 ram, 5 ewes) from England—private ownership.
4 Anglo-Nubian goats (1 ram, 2 does) from U.S.A.—private ownership.
1 Duroc-Jersey boar from U.S.A.—private ownership.

Poultry.

6. (i) Baby Chicks.

Importations by aeroplane have continued increasingly since 1932 from U.S.A. (Miami, Florida, in particular).

1932.	1933.	1934.	1935.
Few experimental lots	2,883 chicks.	13,570 chicks (91 consignments)	16,016 chicks. (98 consignments).

The chief breeds so imported are Rhode Island Reds, Leghorns (White and Brown) and Plymouth Rocks.

(ii) The poultry industry is constantly handicapped by outbreaks of—

(a) contagious epithelioma (especially in fledgings) locally known as "yaws."
(b) sporadic occurrences of fowl cholera (avian hemorrhagic septicaemia)
(c) intestinal parasitic worms.
(d) and in some flocks (extent undetermined) with a condition simulating clinically bacillary white diarrhoea (not bacteriologically confirmed).

General Field Work.

1. *Infectious Diseases notifiable under Law* 29, 1922.

The Island was singularly free of these diseases, some of which, such as rinderpest (cattle plague), pleuro-pneumonia, sheep pox and scab have never been recorded in the Island.

The three listed diseases which have required official action in the past are:—

(i) foot and mouth disease (1922-26) (ii) anthrax (annually recurrent in sporadic form) and (iii) swine fever (traceable in most cases to swill or garbage feeding)—infrequent and sporadic in occurrence.

Foot and Mouth Disease.—

No outbreaks in the year. Last occurrence August, 1926. A "suspected" condition in cattle at Lyssons Estate, St. Thomas, (May 15th) proved to be an edematous and eruptive condition of the muzzle involving the lips and nostrils, in particular, associated with heavy ingestion of guango pods (*Pithecolobium saman*) as frequently occurs during spells of drought and previously reported nearly every year.

Anthrax.—

Two outbreaks were recorded:—

(i) Enfield, Westmoreland. May 7th-8th. Outbreak promptly reported and diagnosed. 40 horse-kind, 550 cattle, 40 sheep involved.

Stock promptly vaccinated: loss 5 head cattle: property quarantined. (May 8th—July 9th): no recurrence during the year.

(ii) Grove Place, Manchester. Outbreak established September 20th by autopsy examination: only cattle involved: initial loss 2 head: exposed stock (158 head) vaccinated: property quarantined (September 20th—October 9th): no recurrence during the year.

Swine Fever:—No outbreaks.

One suspicious outbreak on lands east of Rollington Pen, Kingston, was kept under surveillance for 4 weeks (Nov.—Dec.) Swine Fever was not established. Obscure food poisoning appeared to be the cause of intermittent deaths. With a change of feed and environment the mortality ceased.

2. *Other Infectious Diseases, not notifiable under Law* 29, 1922.

Many of these receive attention by the Department in its general policy of livestock conservation and education in disease control.

(i) *Texas Fever* (*Piroplasmosis bigeminum*)

Many small sporadic occurrences are not reported to the Department.

Generally speaking the cattle are immune to *severe attacks* by reason of tick-infection in calfhood. In other cases large numbers suffer from anaemia associated with mild chronic fever—sub-lethal infection—resulting in lack of thrift, growth and condition. Much of this wastage has been arrested by the dipping tanks as is readily seen in herds in which systematic dipping is maintained.

Herds in which European blood predominates are very much more affected (susceptible) by this sub-lethal infection than those having a definite Zebu factor in their breeding (partial racial immunity).

All the serious outbreaks (often with a high percentage mortality) occur in herds of European blood breeding (Red Polls, Devons, Herefords, Angus, Guernseys, Jerseys, etc.,) and these are also the classes of cattle which exhibit the anaemic conditions mentioned most definitely. The heaviest losses occur in herds where dipping operations are most regularly and zealously practised and applied particularly to calves in early life, thereby preventing their infection and subsequent immunization by tick-borne infection at the most propitious period of their life for the establishment of an active natural immunity.

Outbreaks of varying virulence and extent usually occur when tick-infested cattle break in and associate with these groups of susceptibles and cause tick-infestation of their previously clean pastures.

The foregoing briefly describes the difficult position in which several stockmen find themselves. Some have expressed the view that their safety lies in "going back into ticks," meaning thereby controlled tick infestation (not maintained eradication). A better method, however, would be artificial immunization by a weak or attenuated piroplasma-infected blood (fixed pathogen)—a procedure now under study and consideration.

In acute outbreaks assistance with curative injections of trypan blue is practised, but this method is very unsatisfactory under the large and remote pasture conditions of many herds. Many animals are discovered too late for satisfactory treatment and often inclement weather (heavy or continuous rain) precludes even average success.

Incidence and outbreaks.—

Beside small sporadic instances reported in which only 2 or 3 head would be affected, two large pens—

(i) Woodstock, Westmoreland

(ii) Non-pareil and White Hall, Westmoreland

had intermittent occurrences throughout the year—chiefly in the latter six months.

Tuberculosis.—

(i) No general or comprehensive plan for ascertaining the incidence of this infection has yet been put into action. The subject has been discussed at length with the Sanitary Division of the Island Medical Department in relation to Public Health Regulations (Slaughter House and Milk Regulations) with the view of making the disease notifiable to the Department of Agriculture for record and subsequent action.

Reference to my Annual Report of 1933 (page 17) furnishes information then available on the subject.

Figures since obtained serve to confirm the statement therein, "The percentage in some herds is decidedly high," for tuberculin tests, April-September, 1933—of 4,055 cattle (breeders and calves, fatteners and plantation steers) on 14 properties (14 large herds) showed 148 positive reactors to the test. (28.31% reactors.)

(ii) Returns from the Kingston abattoir and supplementary information from the St. Andrew and other slaughter houses continue to indicate that bovine tuberculosis is more general in the Island than previously estimated.

(iii) Official tuberculin tests of 1935.

1. Herd at Government Stock Farm, Hope, as reported.
2. Herd at Government Stud Farm, Grove Place, August 5-9.
3. Survey test at Belvidere, Hanover, May 14-17. 24 head (1 bull, 23 milch cows)—no reactors.
4. Test for Export Certificate at Shettlewood, Hanover. May 14-17. 10 Mysore bulls—no reactors.

Blackleg (*Clostridium chauvei*).

As previously reported this disease exists on most of the upland cattle properties in the Island. It is less frequent on the coastal area.

Stockmen generally recognize it from its characteristic symptoms. at least, in typical cases, and employ vaccination methods for its control.

Among smaller owners, preventive vaccination by Instructors of the Jamaica Agricultural Society is practised.

Bovine Infectious Abortion.—

There are grounds for suspecting that this infection is gradually spreading in the Island. Authentic reports of its occurrence are difficult to obtain, for owners are not inclined to admit its presence in their herds, but rather to assign such abortions as actually occur to accidents, injuries, fright, worrying by dogs, etc., in fact, to anything other than an infectious agent.

Ulcerative lymphangitis, commonly called "water farcy," is very common and disastrous among mules, especially on the plantations, where mules are kept in large groups in "flypens" or muddy yards. Intravenous injections of biniodide of mercury along with local treatment of the ulcers and sloughs has been of some benefit, especially in early cases. In long-established ones, recurrences of the lesions are frequent. Improved sanitation of the pens, yards, etc., and scrupulous attention to harness and abrasions or injuries is a valuable safeguard. Its incidence is generally in direct relation to the moisture status of localities, nature of soil in regard to good drainage, and attention to skin abrasions and injuries associated with various forms of work.

Internal Parasitic Affections.—

This group has numerous representatives in all the classes of livestock (horses, mules, asses, cattle, sheep, goats, swine, poultry).

The commonest forms are:—

(i) In horses and mules:—gastrophilus intestinalis and hemorrhoidalis, ascaris, oxyuris, strongyli.

(ii) In cattle:—

(a) Alimentary canal: haemonchus contortus, oesophagostomum, ostertagia ostertagi, ascaris and tapeworms in calves.

(b) Respiratory system: dictyocaulus viviparous.

(c) Liver: flukes.

(iii) In sheep and goats:

(a) Alimentary canal:—haemonchus contortus and oesophagostomum.

(b) Liver—flukes (especially in sheep).

(iv) In swine:—

(a) Alimentary canal: ascaris.

(b) Stephanurus dentatus in peri-renal area.

(v) In poultry:—heterakis and tapeworms.

These parasitisms are not usually fatal in their effect, but are definitely injurious to good growth, normal body weight and general thrift.

External Parasitisms.—

The three chief affecting livestock, other than the lice and mites of poultry, are:—

1. Lice (pediculosis). 2. Scabies (mange). 3. Ticks (ixodidae).

Lice Infestations.—

(i) *Of Goats.*—In many districts lice are a great pest to goats, and cause emaciation and, if long neglected, result in their death, especially in times of drought (scarcity of feed) and long-continued wet weather.

If systematically applied, appropriate solutions of nearly all the coal tar disinfectants (cresols), or tobacco concoctions or extract (Black Leaf 40 = 40% Nicotine Sulphate) or Paranaph with or without arsenite of soda are curative and easily applied agents.

Where "Dipping Tanks" charged with Cooper's Cattle Dip, or the Department's Paranaph and Arsenite of Soda are available, one or two "dippings" of affected goats readily cleans them up. The pest is so easily handled that its continuance is due to utter negligence and indifference.

(ii) *Of Other Major Farm Animals*—

Lice have not been observed on native cattle or horses and rarely on swine.

On more than one occasion imported bulls arriving in winter-hair-coat have been "lousy," but after clipping and treatment, as suggested, have been permanently freed of the pest. In no case have the lice spread to the native cattle whose short hair-coat and outdoor life probably affords a safeguard.

A widespread skin disease of horsekind (mange) as mentioned below is generally ascribed to "hair lice," which are in reality the mites (psoroptes communis) of psoroptic mange.

Occasionally a donkey is found lice-infested and the condition may be commoner than my limited observations indicate.

Scabies.

So far scabies in cattle, sheep and goats has not been observed, but is not therefore excluded, in that the matter has not been extensively investigated.

The common and widespread mange of the Island is confined to horses, mules and donkeys (rarely).

Psoroptic Mange of Mane Stock is island-wide in extent. It is most frequent and intense in horses, while mules and donkeys are less susceptible to infection and its attendant ravages.

It is commonly spoken of as "hair lice" and rarely treated, except when in aggravated form. It spreads most rapidly during the winter months of the year when the coat is heaviest and thickest.

Many are the local remedies used and claimed to be sure-cures, but often on little or no foundation. Baths of tobacco concoction, Black Leaf 40 (40% Nicotine Sulphate), propriety arsenical cattle dips as well as the Department's formula of Paranaph and Arsenite of Soda have been tested. All when systematically employed materially improve conditions, but best results have been obtained with standard lime-sulphur mixture either as a wash or as a dipping fluid.

Ticks and Tick Control (Law 41 of 1920)—

(i) As may be seen from Reports of previous years (1929-34) no systematic inspection in connection with this livestock project has been possible for years due to lack of staff and other demands on the veterinary service.

Although tick control by "dipping" is still maintained on numbers of cattle properties, as may be judged by the sales of Paranaph and Arsenite of Soda from the Government Laboratory Stores, the general status of the project is far from satisfactory and in need of stimulation and regular supervision by the Department.

Tick infestation of the livestock is on the increase and the amenities of the country parts are being adversely affected.

(ii) Number of Registered Dipping Tanks in:—

1928.	1929.	1930.	1931.	1932.	1933.	1934.	1935
305	329	341	351	362	368	372	376

Several are in such bad order that they are out of commission.

(iii) Sales of Paranaph and Arsenite of Soda.

Lbs.	1928.	1929.	1930.	1931.
Paranaph ..	37,353	37,840	33,572	36,770
Sodium Arsenite	21,900	21,725	20,175	25,499

Lbs.	1932.	1933.	1934.	1935.
Paranaph ..	34,965	39,850	33,373	36,654
Sodium Arsenite	22,021	24,818	20,300	21,200

The decrease of sales in 1934 and 1935 may in part be due to the depression in the cattle industry of those two years. Owners have had materially to reduce their expenditure because of the decline in their revenue.

Poisonous Pasture Plants.—

Reports of sudden (generally termed "mysterious") death of cattle, often assigned by owners to suspected anthrax, are received every year. Most of these upon investigation have proved to be poisoning by the ingestion of Jamaica nightshade (Urechites suberecta).

One such occurrence was investigated at Belair, St. Ann, during the year (Nov. 15th). For a fuller report on the plant in relation to livestock see page 13 of Annual Report of 1926.

Haematuria of Cattle. (Haematuria vesicalis)—

No further work on this disease was done in the year. It is seldom now reported to the Department, although sporadic cases continue to occur in previously known affected districts—Southern Manchester in particular.

See first report under "Red Water (Haematuria) of Cattle in Manchester" on page 16 of Annual Report, 1924.

Arsenical Poisoning of Cattle.—

Two instances were investigated:—

1. Southampton, St. Elizabeth, (June 2nd) where some 6-8 head were lost through dipping certain members of the herd on successive days in a dipping fluid of normal or standard strength.

2. "Camp Pasture" near Cross Roads, St. Andrew (Nov. 17th) where 6 head were lost by the ingestion of arsenic. The source of the poison was not established, even with police aid. The circumstances suggested malicious or accidental origin.

Poultry Diseases.—

As already indicated, any attempt to rear poultry in large flocks is beset with many difficulties, including the depredations of prædial and nocturnal thieves.

The most serious diseases are:—

(i) *Contagious epithelioma,* termed "yaws" locally. Control by vaccination as practised in many countries has so far not been possible due to insufficient staff and facilities.

(i) *Fowl Cholera* (avian hemorrhagic septicaemia) of sporadic occurrence. A subacute form, indicated mainly by death of laying hens exhibited at autopsy acute or chonic peritonitis from ruptured ovisacs, has been observed on many occasions.

Vaccination one or twice yearly with hemorrhagic septicaemia aggressin has been beneficial, both in acute and chronic infections.

(iii) *Roup*—

The true entity of this disease in flocks visited has not been established. It appears to be definitely associated with damp weather conditions and crowding.

(iv) *Bacillary White Diarrhoea* (Bacterium pullorum)—

Reports from some flocks strongly suggest this infection, but bacteriologic evidence has not been obtained.

3. *Veterinary Services in Government Institutions.*

Veterinary service was rendered, as reported below, in the following Institutions:—

1. Government Farm School at Hope, 2. Government Stock Farm, Hope, 3. Stud Farm, Grove Place, Manchester, 4. Public Works Department. 5. Prisons Department. 6. Lunatic Asylum. 7. General Post Office.

Government Farm School at Hope.

Lectures and demonstrations in veterinary science were conducted in accordance with the curriculum of the School—3 periods of 2 hours each—supplemented as occasion offered with demonstrations on the Farm and by visits to other dairies.

Government Stock Farm at Hope.—

Weather and rainfall at the Farm for 1935 were nearly as good for the livestock as in 1934—an excellent year—except in the closing months of November and December, which were very dry (1.10 inches against 14.14 inches in 1934) after an above-average fall in October (19.01 inches as against 9.80 inches in 1934)

Total Rainfall.—1st six months. 13.08 inches.
2nd six months 40.67 inches.
Total 53.75 inches, 1.54 inches above average.

Usually the difficult dry period at the Farm is in the first six months of the year, but 1934 and 1935 were pleasant exceptions as the following shows:—

January-June Rainfall—

1934:—Total fall 14.1 inches. Lowest falls in January (1.78 in.) and April (2.03 in.)
Greatest falls in February (3.17 in.) and May (3.10 in.)

1935:—Total fall 13.08 inches.
Lowest fall in January (0.23 in.) and April (0.53 in.)
Greatest fall in May (3.69 in.) and June (3.58 in.)

A good fall in February-March (the middle of the dry period) is particularly helpful in carrying the stock through. —In this respect 1934 and 1935 proved beneficient with 6.46 inches and 5.05 inches respectively. When these two years are compared with the terrible year of 1928 for the same period the contrast is very marked.

January-June, 1934 yielded 14.19 inches with lowest fall of 1.78 in January.

1935 yielded 13.08 inches with lowest fall of 0.23 in January.

1928 yielded only 9.91 inches total for the *six* months, of which 6.31 inches fell in May, while only 2.30 inches fell January-April inclusive.

There was no difficulty in carrying the herd through such favourable years as 1934 and 1935.

Horses and Mules of Hope Gardens and Farm.

Their general health has been good, and, except for occasional physicking for worms and lack of condition, treatment for lameness resulting from "gathered" nails, corns, tendon strain, abscesses, etc. have required but little veterinary attention.

One mule, Jane, belonging to the Hope Gardens died on May 5th after two days of colic and at autopsy showed torsion of the mesentery of the lower part of the small intestine.

Cattle.

1. *Tuberculosis.—Tuberculin (Intradermal) Tests of the year.*

(i) May 27.-30. Test by Mr. G. O. Rushie Grey, Veterinarian to Kingston and St. Andrew Corporation Animals tested 137 cows only—the group then in milk: no foster mothers, young stock or bulls.

Result. 5 positive reactors, namely 1. Dodo 7th, 2. Baba 3. Rosette 9th. 4. Peach. 5. Solignum. Four of the five showed gross lesions at autopsy examination.

(ii) November 18-23. Test.

Cattle tested:—

(a) 457 Farm cattle consisting of—
37 bulls—13 stud bulls, 12 bulkins, 12 bull calves.
227 cows—24 Red Polls, 13 Jerseys, 10 Guernseys, 180 grade cows.
177 heifers and cow calves.
16 working streers.

(b) 5 cattle of other ownership.

(c) 12 cattle of the Water Works adjoining the Farm.

Result of Test:—

(a) No positive reactors among the 12 Water Works' cattle or 5 head not owned by the Farm.

(b) 21 positive reactors and 10 suspects (among heifers) in the 457 group. i.e. 4.81% of the Farm herd proper.

Reactors:—

5 cows: Mangel, Lily, Lydite 13th, Lad's Brisk, Prioress.

3 bulkins: Florina's Pusa, Hope Fon, Theagenes 5th.

13 heifers: Winnie, Venus, Veracity 2nd, Meadow 1st, Cowslip 1st, Coriander 2nd, Notion, Melba 4th, Saysa 2nd, Minerva 2nd, Sylvia 1st, Donorma 3rd, Soledad 2nd. The 10 "suspects" were later retested with negative findings.

Post mortem examination of 8 of the reactors (the 13 heifers were isolated and held for a retest later) showed visible lesions in all, except Red Poll, Prioress.

A full investigation of the whole matter is being conducted in an effort to explain the occurrence and trace its origin, and additional precautions against perpetuation of infection have been instituted. Such a high incidence of infection among the young heifers (13 out of 66 yearling and under year age) has never been previously recorded on the Farm.

Tuberculosis Record of Farm.

The following table shows incidence of Tuberculosis at the Farm for nine years, 1927-35.

Month of Test.	Number Tested.	Result.	Percentage Infection.
January, 1927 ..	359 head	20 reactors	5.56%
July, 1927	303 "	1 reactor	0.33%
December, 1927 ..	312 "	1 reactor	0.32%
November, 1928 ..	297 "	1 reactor	0.33%
October, 1929 ..	342 "	1 reactor	0.29%
August and October, 1930	326 "	No rectors	Nil.
December, 1931	348 "	1 reactor	0.28%
June, 1932	227 "	No reactors	0%
June, 1933	293 "	No reactors	0%
June, 1934	407 "	14 reactors	3.4%
November, 1934 ..	401 "	7 reactors	1.74%
(i) May 27-30, 1935	137 "	5 reactors	(only cows in milk tested
(ii) Nov., 18-23 ..	457 "	21 reactors	4.81%

2. *Infectious Bovine Abortion (Bang's Disease)*—

So far it has not been practicable to make any drastic changes in dealing with this infection or to carry out periodic agglutination tests for diagnostic or segregation purposes.

Parturition and Abortion Record, 1928-35.

Year.	Full Time Births.	Still Births.	Abortions.	Dystokia Deaths.
1928 ..	94	2	5	
1929 ..	81	2	8	
1930 ..	118	4	4	
1931 ..	126	..	9	
1932 ..	127	1	9	
1933 ..	144	4	7	
1934 ..	148	6	nil.	
1935 ..	158	3	4	2

As it is generally conceded hat a great deal of sterility (temporary and permanent) of cattle in abortion-infected herds is associated or traceable to that infection of such a complex symptomatology the following is recorded.

Year.	Sold to Butcher.	Cows.	Heifers.	Assigned Reason.
1933 ..	..	11	11	Barren
1934 ..	..	7	3	..
1935 ..	..	2	4	.

While this statement may in large measure support the above view in relation to sterility (male and female), many cattle properties in the Island, where infectious abortion disease *does not exist*, complain of the low percentage of "droppings" (calvings) in their herds, and the abnormal period of time between "droppings." There are probably other contributory causes.

3. *Tick Fever (Piroplasmosis bigeminum)*—

Regular dipping of the herd was maintained through the year, and generally speaking rains did not seriously affect adversely the efficiency of tick control by washing the fluid off the cattle's bodies soon after dipping, as was the case for nearly three months of 1933. (August-October, 1933). No cases of tick fever were recorded during the year.

4. *Blackleg (Clostridium chauvei)*—

No clinical cases for the year. Hope is not a badly infected area, but precautionary annual vaccination is maintained by the use of Blackleg Aggressin.

Vaccination (March 27th). 48 heifers, 5 bull calves—all the age-susceptibles then in the herd.

5. *Obstetrical Cases.*

(i) Three cases of dystokia with fatal sequelae: 1. Rosastene, 2. Wye 1st., 3. Recovery.

(ii) Six cases of retention of foetal membranes: four as sequel of abortion: two after full-time parturition.

6. *Pneumo-Enteric Diseases of Calves.*—

There was the usual annual quota of these types of cases among the pail-reared calves.

The loss was seven head inclusive of two weaklings killed shortly after birth.

7. *Death List with Causes.*—

Horses and Mules.—Mule, Jane: colic with torsion of mesentery.

Cattle.—

1. Bulls: Imported Montgomery Bull, Pusa. Superannuated when 18 years old and killed. Imported from India in 1921.

2. Cows, heifers and calves killed on Farm being reactors to tuberculin test:—
(i) Cows: 1. Baba, 2. Dodo, 3. Glen's Ethelstine.
(ii) Killed as physical "suspects" of tuberculosis because of emaciation, none-reactors to tuberculin and no-lesion cases at at autopsy: 1 Cow, Perfect (Jersey), 2 and 3. Young heifers. (4 months old), Quack 2nd and Paint.
(iii) From dystokia and Sequelae. Cows:— 1. Rosastine, 2. Wye 1st, 3. Recovery.
(iv) Acute Mastitis with pneumonia. Cow. Malina.
(v) Calves:—
2 calves killed—weaklings at birth.
5 calves died of pneumo-enteritis.
2 calves died from kidney trouble (uraemia).
1 calf, killed on account of chronic shivers (tremors).
1 calf-killed—fractured leg.

Poultry.
Flock infections dealt with during the year were:—(i) Fowl cholera (B. avisepticus).
Symptoms: death from peritonitis arising from ruptured ovisacs, or obstruction of oviduct (egg bound). Bacteriologic finding of B. avisepticus.
Vaccination (April 8th) of all the poultry (82 birds) with Hemorrhagic Septicaemia Aggresin checked the condition and mortality for 3-4 months, when there was a recurrence which was again arrested by a second similar vaccination of 127 birds (July 29th).
5 birds died from this infection and its complications.
(ii) Contagious epithelioma (chicken pox) locally called "Yaws".
There was a small outbreak in October—November among the cockerels and pullets with a loss of three birds. Other affected birds recovered under topical treatment with mild antiseptics.

Rabbits—
The rabbit project undertaken in 1934 was abandoned as a failure at the end of July, 1935 after about 12 months trial.
The animals failed to breed satisfactorily in the hutches, suitable herbage and roots were difficult to obtain on the Farm or locally. Some died of hemorrhagic septicaemia, others of snuffles, a few of ear mange and one showed hepatic coccidiosis at autopsy.

Stud Farm at Grove Place, Manchester.—
1. Weather conditions generally were good for the livestock.
2. Twenty-four official visits were paid in the year: 3 in first, 9 in second, 9 in third, 3 in fourth quarter.
3. Underground Water Survey.
Through the kind offices of Mr. John Lockett, engineer, a survey was made on March 1st of the possibilities of an underground water supply for Grove Place and reported on.
4. In addition to general veterinary supervision of the livestock and minor surgical work, the following major matters were carried out as reported below:—

Horses, Mules, Asses.—
Mange (psoroptic) of the horse kind still exists and tends to recrudesce in the winter months. Several mares arrive to the stud in a mildly affected state in spite of repeated warnings to patrons. Such arrivals naturally preclude eradication of the infection on the Farm and materially increases the work and responsibility of those in charge.
Lime-Sulphur wash still continues to be the most efficacious of tested remedies.

Cattle.—
Tuberculin Test (Aug. 5-9).—
The test showed no positive reactors as on previous occasions.
Record of Tuberculin Tests.

Date.	Farm.	Number Tested. Cows to Stud.	Result.
November, 1924	214	..	All negative
April, 1925	420	..	" "
July, 1930 ..	162	..	" "
July, 1933 ..	150	..	" "
August, 1935	141	5 = 146	" "

Blackleg Vaccination.—
Experience has shown that some land areas of Grove Place are blackleg (Colostridium chauvei) infected. Accordingly annual vaccination of all the young cattle with Blackleg Aggressin has been practised for many years, and shortly after the introduction of sheep they were also so treated.
The annual vaccination of 1935 was performed on all the cattle of susceptible age and the sheep.

Intermittent Deaths of Cattle and Anthrax from March 11th-August 29th.
Between March 11th and August 29th, 11 adult cattle died. Personally performed post mortem examinations on two cases (May 18th—the first case referred to me—and August 2nd) indicated impaction of 3rd stomach with general intestinal stasis. Post mortem examinations of four other cases (April 4th, June 20th, June 26th, July 4th) by the Superintendent of Livestock at Grove Place indicated

the same cause of death. A suspicion of the possibility anthrax, although the autopsy was not at all typical for that infection, was ruled out by negative bacteriologic findings in regard to the case of May 18th and subsequent case of August 2nd personally autopsied.

The pond waters were tested in July (July 4th) for arsenic with negative results. The cows had their grazing supplemented with salt and mashes of bran and linseed meal, June-July. This improved conditions, but did not entirely arrest the mortality for two cows died thereafter (Aug. 13th and 28th) similar similar conditions.

On September 18th and 19th two cows (Irene and Amanda, respectively) died after about 30 hours evident sickness. Autopsy of each revealed typical gross lesions of anthrax and a field diagnosis of that infection was made, but not fully confirmed bacteriologically, that is, blood and spleen films both showed strongly suggestive anthrax forms, but cultures proved negative.

However, proceeding on the field or autopsy diagnosis the entire herd of cattle was anthrax vaccinated September 23-24 with prompt cessation of the mortality thereafter.

Memo. of Cattle anthrax vaccinated September 23-24:—5 bulls, 64 cows, 51 heifers, 2 draft steers 7 cows to stud—129 head. Unweaned calves not vaccinated.

Memo. of Deaths with Causes of 1935.—

Mane Stock.:

"Kentucky Boy" imported Ass—superannuated at 18 years of age and killed 22.5.35. Imported from Kentucky in 1921 as a four year old.

"Kada:" donkey cub (inbred and weakling from birth)—killed 21.1.35.

"Pigeon"—cart mules: died suddenly (9.8.35) from rupture of aneurism of anterior mesenteric artery.

Cattle.—

8 cows from impaction of 3rd stomach with general intestinal stasis, viz. Glance, Winnie, Message, Bene, Kathleen, Romance, Gladiola, Hilda.

4 cows: cause undetermined: found dead on Back Run, etc. and no autopsy made, viz. Enid, Pauline, Rosy, Effie.

2 cows: Irene and Amanda from Anthrax (September 18-19).

3 cows: Twink (very emaciated), Lou from parturient troubles, Feather—choked by an orange.

5 calves: 3 from diarrhoea, 2 from congenital weakness.

Swine.

"Riching Bon Accord": imported Berkshire boar from England (1932) from heat stroke at May Pen Show 20.4.35.

Public Works Department.

1. Veterinary services to the P.W.D. Mule Purchasing Committee on their tour, October 15-18, when the following places were visited for inspection of animals:—Linstead (St. Catherine) Lucky Hill (St. Mary), Goschen, Hopewell, Claremont, Carton, Annandale, and Malvern Park (all in St. Ann), Clark's Town and Falmouth (Trelawny), Christiana and Mandeville (Manchester), Pepper, Santa Cruz, Malvern Wells, Hermitage and Lower Works near Black River (St. Elizabeth).

2. Visits as follows for report on or treatment of mules:—St. Andrew: Halfway Tree—10, Gordon Town—1; St. Catherine: Spanish Town—4, Lluidas Vale—1, Old Harbour—2; Clarendon: May Pen, Belle Plain, Chapelton and Cottage (Vere)—1 each; St. Mary: Port Maria—1; Manchester: Mandeville—4; Mile Gully, Christiana, Spalding—2 each.; St. Elizabeth: Santa Cruz; Lacovia, Black River—1 each; Westmoreland: Savanna-la-Mar—1.

Lunatic Asylum, Kingston.

Castration and docking of the 1935 crop of lambs with Farm School students on April 8th.

40 ram lambs castrated and docked.

44 ewes lambs docked.

Department of Prisons.

Three visits for treatment of lame mules and as member of Board of Survey.

Post Office Department.

August 21-22. Investigation and Report on vehicles and draught animals of Messrs. Messias and MacCaulay, Mail Contractors.

Educational Work.

1. Lectures and demonstrations in veterinary science at Government Farm School, Hope, of 2 hours each three days a week with supplementary demonstrations on the Farm or nearby properties as occasion offers.

2. Lectures to members of Department Staff Conference (January 14-15).

(i) "Limitations and Shortcomings of the Tuberculin Test" followed by a post-mortem study of a tuberculin non-reactor, (Jersey cow, Perfect), "suspect" by physical condition.

(ii) "American Foul Brood of Bees in relation to European Foul Brood and Sac Brood" with demonstrations of American Foul Brood infected brood (larvae).

3. Lectures in Summer Course in Agriculture at Hope (July 22-27):—

(i) "Principles of Animal Breeding and Selection."

(ii) "Foul Brood and Sac Brood of Bees."

4. Address at Annual Meeting of St. Elizabeth Branches Associated (Jamaica Agricultural Society) on May 25, 1935 at Lacovia on "Animal Husbandry in Relation to Agriculture."

5. Address at Hylroy Apiary on December 19th, "Beekeeper's Day," on "The Government Control of Foul Brood Disease of Bees."

6. Numerous letters throughout the year to correspondents dealing with veterinary and livestock matter and queries.

PUBLICATIONS.

1. Short article in Journal of Jamaica Agricultural Society on "The Care and Management of Jacks" (January, 1935).

2. Lengthy article to same Journal in June and July, 1935, on "American Foul Brood Disease of Bees."

STATISTICS.

1. *Animals exported:* 1935.

Horses.—
2 Thorough-bred stallions to British Honduras.
3 Jacks to Spanish Honduras.
1 Jack to British Honduras.
15 pack mules to Republic of Panama.

Cattle.—
11 Red Polls (1 bull, 10 heifers) to Spanish Honduras.
3 Mysore bulls to Ecuador, South America.

2. *Animals imported,* 1935.—

Stud Animals.—
Horses.
Stallions and jacks | Nil.

Cattle.—
2 Aberdeen Angus bulls from U.S.A.
1 Hereford bull from England.
1 Shorthorn bull from England.

Sheep.—
1 Suffolk ram and 5 ewes with 6 lambs from England.

Goats.—
1 ram, 1 doe (Anglo-Nubian) from U.S.A.

Swine.—
1 Duroc-Jersey boar from U.S.A.

Racehorses—
32 from or via England.

Dogs.—
43 less 4 intransit =39 all from England.

Agouties.—
2 from Cayman Islands for Institute of Jamaica.

S. LOCKETT, V.M.D.
Government Veterinary Surgeon.
17th March, 1936.

Report on Foul Brood (American) Disease of Bees, January—December, 1935.

1. Annual Report of 1934 reviews the history of American Foul Brood in Jamaica and the measures taken during November and December of that year in dealing with this third occurrence of the disease in the Island.

2. During the year and in compliance with Orders under The Protection from Disease (Bees) Law, 1918, (Law 9 of 1918) the number of apiaries registered in Kingston and St. Andrew (the infected area) increased from 35 at close of 1934 to 126 on 31.12.35 and in the other parishes of the Island from 78 to 292.

3. No apiaries have been found on reported foul-brood infected outside the parishes of Kingston and St. Andrew, indicating that the infection has remained confined to Kingston and St. Andrew (the lower or plains area) ever since September-November, 1934—period of the inception of the present outbreak.

4. The following table shows the registration of apiarists, apiaries and number of colonies (estimated in part) and the number of infected apiaries in 1934 and 1935, in Kingston and St. Andrew (the infected area) and the other parishes of the Island (uninfected area).

	Year.	Registered Apiarists.	Registered Apiaries.	Total Colonies (Estimated in part).	Infected Apiaries.
Kingston and St. Andrew	Nov.-Dec. 1934	31	35	1,149	10
	Jan.-Dec. 1935	31+66 =97	35+91 =126	1,149+2,130 =3,279	10+3 =13
Other parishes	Nov.-Dec. 1934	55	78	6,193	nil.
	Jan.-Dec. 1935	55+102 =157	78+214 =292	6,194+6,251 =12,444	nil.
Status of Registration 31.12.35 for Island		254	418	15,723	

Note.—Probably these figures represent half the apiarists and two thirds the number of apiaries in the Island, because most of the larger operators owning several apiaries are already registered.

5. (i) Four of the 13 infected apiaries have shown no recurrent infection since 31.12.34 and 3 since 30.6.35.

(ii) In six of the 13 infected apiaries in which the initially infected colonies were discovered early and immediately and completely burnt, no secondary or recurrent infection has appeared for 4 months or longer. This would indicate the efficiency of incineration in toto of infected colonies as a method of control or eradication. In the other 7 apiaries infection had been a month or more in existence before its discovery and the prompt arrest of recurrent infection has not been accomplished.

6. In 12 of the 13 infected apiaries all colonies found infected up to 31.12.35 had been burnt—55 colonies in all.

In the 13th apiary, the owner under coercion in most cases burnt the first 31 colonies infected and thereafter refused to destroy any more infected colonies. Later his entire apiary of 58 colonies and fixtures was totally destroyed by Order of the Governor on 3.3.36.

7. In spite of difficulties and drawbacks, systematic official inspections of the apiaries was maintained throughout the year. Although the disease has not been eradicated, it has been suppressed and limited in its spread and with persistence may yet be eradicated.

8. The work entailed under the Law (Law 9 of 1918) and its Orders has been carried out by the Government Veterinary Surgeon, Henry S. Holt, S. A. Hibbert, H. H. Coote (up to April 11th 1935) Jamaica Agricultural Society Instructors, P. St. L. Bacquie and A. P. Hanson—"persons" appointed under the Law and responsible to the Director of Agriculture.

9. As the work progressed in 1935 it was found necessary to obtain larger powers under the Law for the control of the Disease. Accordingly the 1934 Order of Gazette Extraordinary dated November 15th, 1934, was revoked, and the 1935 Order dated September 20th, 1935, was made in lieu thereof. (Vide Jamaica Gazette of September 26th, 1935).

S. Lockett,
Government Veterinary Surgeon.
17th March, 1936.

(ix) *Report of the Supervising Inspector of Plant Diseases.*

I submit herewith a Report on the work carried out under my supervision for the year ended 31st December, 1935.

2. I was absent from the Island from 25th January to the 3rd March, 1935 when Mr. A. F. Thelwell, Superintendent of Grove Place and myself went on a visit to the Imperial College of Tropical Agriculture in Trinidad. On the return voyage I visited Panama and Limon. I investigated the symptoms of Panama Disease at both these places and found them to be the same as in Jamaica. At the Imperial College Mr. Thelwell and myself were given lectures by many of the Professors and we were taken over the important agricultural districts of the Island by the Director of Agriculture and his officers.

3. The "one-root" system of treating Panama Disease has been adopted in the badly infected sections of the Island and the planters are co-operating with the Department. Many so-called "cures" were investigated but without success. Complaints from planters were investigated and only one case of prosecution, for abusing an Inspector, was instituted.

4. On the 9th July a plot to test the resistance of Highgate bananas to Panama Disease, as compared with the Gros Michel, was laid out on a property in St. Thomas-ye-Vale. One hundred each of Highgate and Gros Michel were planted out in alternate rows of ten each. On inspection in December, 62 of the Highgate variety were suffering from Panama Disease, and 84 of the Gros Michel variety had gone down in the same plot. The experiment will be carried on to watch the results in the ratoons.

5. Two acres of the seedling variety S. 19 have been planted out at Coleraine so as to extend the plot which was grading 85% before the storm. Several experimental shipments of seedlings, Cavendish and Highgate were made.

6. During the year continuous demands for suckers of the S. 19 seedling were made, and some 400 suckers were distributed by Inspectors of Plant Diseases in the parish of St. Mary. Three hundred and sixteen (316) suckers of the Highgate variety were distributed to settlers in every banana growing section of the Island. The Giant Plantain which bears bunches of 16 hands sometimes weighing 150 lbs. was propagated, and a distribution of 560 suckers was made throughout the Island. Supervision of all banana breeding plots was regularly kept up and seeds obtained were handed over to the Geneticist or his assistant for germination.

7. During the absence of the Geneticist on leave transplanting of seedlings and extension of the Hope Experimental plot were carried out.

Citrus.

8. The work on the Citrus Extension Scheme was pushed during the year. Mr. M. B. Baker was added to the staff in the middle of the year to assist in the Loan Scheme. Forty thousand and twenty-eight (40,028) plants were distributed, the planting of the majority being supervised by an officer of our Department or an Agricultural Instructor. There are some twenty plots established in groves from two to thirty acres. Every attempt has been made to encourage the settlers suffering from Panama Disease to plant citrus. Even one plant is sometimes sold to and planted for a settler in a district badly infected with Panama Disease.

9. M. Edwards, an apprentice, got employment during the year. The health of the apprentices was good during the year and they gave excellent service in the distribution and lining out of groves in various parts of the country.

10. There are now 15,000 plants of 16 varieties ready for distribution; some 5,000 plants will be budded in March, 10,000 will be budded in August, and a nursery has just been started with 100 quarts of sour orange seeds.

11. The assistance given the Agricultural Department by the Standard Fruit Company, the Caymanas Estates, and the Prison Authorities has been highly appreciated.

12. I also visited and inspected several properties under consideration for Land Settlement Schemes.

J. B. Sutherland,
Supervising Inspector of Plant Diseases.

(x) *Report of the Agricultural Officer.*

I have the honour to return my Report for the year ending 31st December, 1935.

The establishment of Citrus under grove conditions has been maintained and considerably extended, during the period, as evidenced by the quantity of plants distributed.

A. Field Work.

1. *St. Mary.*—As was the case in the previous year most of my time was spent in the parish of St. Mary, which, being for so many years the premier banana producing parish with most suitable conditions for that cultivation, has found it very difficult to change its timeworn habits. Circumstances created by the steady advance of Panama Disease, however, have forced many to see the wisdom of testing one or more alternative crops for self-protection, and in consequence there is a greater number in the field this year with small plots under observation than might have been anticipated. Unfortunately the movement amongst the large planters proceeds at low speed, but even here one has encountered some small encouragement from this source, there being at least two properties with 1,000 plants already set out, with a spirit at work suggestive of further extension in the near future. The lands in both cases have been so seriously inundated by disease that banana cultivation proved to be risky and unprofitable.

2. Another encouraging feature is noted in the gradual increase on the part of other planters on their own account. One planter on whom we had to force 12 plants in the first instance, with minor inducements subsequently set over 100 plants in another property, and despite the setback caused by drought for 5 months of the year, prepared mounds of his own accord for another 50 plants which we set in December, and now an order has been placed for further extension in the near future. The work has been slow and at times disheartening but now suggests a promise of fruit-bearing. As will be noticed the distribution in St. Mary is greater than that of any other parish.

3. *Portland:*—The work here has been continued by Inspector Wilmot, though I have visited and overhauled all the most important efforts. Here again the larger property-owners are making beginnings even on a small scale to test out this new enterprise as a possible solution, in part at any rate, to their increasingly difficult position.

4. *Manchester.*—It will be observed that Manchester has stepped up from the 5th place in last year's distribution to the 2nd position, largely owing to the response from that parish to the offer under the Citrus Loan Scheme in operation since July. As is now a fact of common knowledge, given the necessary care, conditions in most of that parish are highly attractive for citrus culture. Ample opportunity is now afforded for exploding the hypothetical statement which has been promulgated that citrus plants from the irrigated lowlands prove to be unthrifty and consequently unproductive for an extended period when transferred to upland properties. Since October, 1934 we have sent plants to Manchester hills and even to over 3,000 feet in the Blue Mountains, and have entirely failed to observe any appreciable difference in their behaviour from that of their locally cultured neighbours. Now that Grove Place has received 2,014 of our plants for the manurial experiments and otherwise, the scope for this test has been widely extended.

5. *St. Catherine:*—Comparatively few St. Catherine planters in St. Thomas-ye-vale, where there is ample proof of the suitability of the surroundings for this crop, have taken our plants, but those who have are apparently satisfied with their venture. The largest establishment in this parish is in the Sligoville area, where beginning from zero in July we have now set 2,100 plants, presenting (at the moment of writing) much promise for good growth.

B. Interplanting.

1. Interplanting of other crops for the purpose of (i) yielding some return, (ii) keeping the land in good order, and so reducing the cost of upkeep, (iii) for green manuring, and (iv) providing windbreaks, is being tested under fairly close supervision.

2. As far as can be judged corn (maize) interplanted with a legume, answers to all these requirements for the recently planted citrus and offers no seriously objectionable features. Cane has also proved beneficial in some locations. Though vegetables have been tried, the instruction and attention has perforce been spasmodic and so variable as not to lead to results of a positive character. Tomatoes and cabbages with a little cauliflower have given fair returns, and pumpkins and watermelons are successful in some localities. Irish potatoes give some indications of promise and will be tested again. All the usual catch crops are planted and fulfil one or more of the demands.

3. In banana parishes it is almost impossible to omit bananas, and this is permitted under very careful direction, the arrangement being to destroy after the first fruiting if necessary. In justification of the interplanting it might be added that as a windbreak it has already proved beneficial.

4. It might be wise to state that we endeavour to plan for this interplanting having due regard to the requirements of the planter from his point of view, and also those of our citrus plants. There is reason to believe that this movement will help further to weld the interests of the Department with those of the small cultivators.

C. Demonstration Plots.

1. There are two accepted demonstration plots in St. Mary, at Islington and Highgate; one in Portland, at Berrydale in the Fellowship area; and one in St. Thomas, at Llandewey. As things are at the present time, however, practically every plot planted by us is under our direct care and the ready co-operation of owners is fairly generally accorded.

2. In a few instances the necessity of keeping the circle surrounding the plant clear of weeds has not yet gripped the mind, and planters are disposed to delay weeding until the whole field can be properly handled, usually causing degrees of loss in the development of the plants. By constantly emphasizing the requirements we are gradually succeeding in getting our plans adopted.

3. Manurial tests have been made after a principle arrived at in consultation with the Agricultural Chemist, whose absence for the last part of the year has prevented his checking the plots. This necessitates the co-operation of the planter, who is required to pay the cost of the manures, at the offset amounting to about 1½d. per plant but increasing from year to year.

D. Citrus Loan Scheme.

1. The advent of the scheme for loans to citrus growers in July has resulted in a fresh impetus to advancement. 15 plots aggregating 110 acres have been satisfactorily set out and are doing well with few losses, nearly all the plants being the product of the nurseries at Spanish Town.

E. Distribution of Plants.

1. 40,028 plants were issued as per details in the attached tables. Quite the large majority o these are in good order, and are likely to become serviceable trees. A severe drought, lasting from March to August and even later in some districts, exacted its toll from our citrus plants, though not so severely as might have been anticipated on the basis of the experience of the past. Some watering was carried on but much of it had to be adjusted as the methods were calculated to do more harm than good. From the practical experience gained in this measure of adversity we have decided to induce St. Mary planters on the heavier class of lands to fork through the field in February to March, or in other words, at the end of their season of steady rains, and to mulch the mounds with the weedings at the same time. When this was not done the extensive cracking of the soil and even of the actual plant had decidedly increased the difficulties created by the lack of rain.

2. Again acting on judgments formed by the circumstances of the past, every endeavour has been made to have plants set either by our own trained labour or under the very careful supervision of experienced hands. Wherever practicable, and the quantity was ample to warrant the expense, we have taken the plants in a truck and had the whole transaction executed ourselves. On occasions where plants have been taken by private delivery or by rail, the Inspectors of Plant Diseases or the Agricultural Instructors have been required to assist. In a few instances some have been badly handled, resulting in a heavier percentage of replacements than usual.

3. Under the Loan Scheme every plant has been planted under the most careful supervision and so far the position is thoroughly justified. It may be necessary also to add that plants are usually issued only where the mounds have been prepared and weathered for some time. Here again some examples are to be found where breaches have occurred, but we have gone as far as taking the plants to the spot and without planting any at all removed them to another spot where the preparations have been made according to directions.

F. Nursery.

1. I assisted in the nursery, particularly in regulating the staking and pruning of the growing buds. We were able to obtain bamboos through the co-operation of the Irrigation Officer at Spanish Town and his assistants, who readily answered to every call of ours for supplies, enabling us to push on with the staking as soon as circumstances demanded. A replanting was made, but for want of space, on a far less pretentious scale than formerly. We tested out an interplanting at the Prisons Nursery through standing plants, likely to be removed in a few months, but cannot record a great measure of success there with this method. At Caymanas those interplanted in the previous year yielded very encouraging results.

G. Miscellaneous.

1. The staff has been used in budding outside to a limited extent. Some budding in the country parts is also done on my rounds, a labourer trained by me assisting in this effort.

2. Advice on request was furnished to applicants to Head Office on top-working of Sour Orange on a large scale and in established fields and nurseries, two of these coming from St. Thomas. The work which Mr. L. A. Wates, former Agricultural Instructor, is doing is very thorough and is a great help to the Department.

3. It would hardly be right to close without expressing appreciation of the assistance at the Prisons Nursery of the Superintendent and his officers, who provide most of the labour. Occasions have occurred when we have appeared to be at variance, doubtless owing to each considering the other to be too exacting, but in every case amicable adjustments have been reached, and truly happy relationships exist. We are decidedly grateful to them for their useful service.

4. To the Agricultural Society's Secretary and Field Staff we are indebted for the organization of some deliveries and for assistance in planting.

H. Meetings, etc.

Beside Departmental conferences, of which I attended two, and the summer course of Lectures and Demonstrations in July, I was present and spoke at meetings of the Branches of the Jamaica Agricultural Society at:

Wood Park,
Carron Hall,
Highgate,

and a meeting with teachers at the Llandewey Plot in St. Thomas.

The Department made an exhibit at the May Pen Show to which I contributed, attending also on the day of the show and assisting in furnishing information as required.

L. L. Carrington,
Agricultural Officer.

Distribution of Varieties.

Grapefruit:	
Marsh Seedless	26,374
Davis Seedless	3,206
Thompson Pink	299
McCarty	33
Orange:	
Valencia, Isleworth	5,335
Valencia, Reasoner	2,468
Lue Gim Gong	139
Surprise Navel	1,387
Waite Parson Brown	351
Lambs Summer	30
Hamlin	53
Temple	35
Tangelo, Thornton	87
Tangelo, Seminole	45
Tangelo, Lake	63
Lakeland Limequat	44
Villa Franca Lemon	5
Perrine	57
Oranguma	2
Rusk Citrange	3
Tahl Lime	12
	40,028

Distribution in Parishes.

St. Mary	7,892
Manchester	7,827
St. Catherine	7,503
Clarendon	4,380
Portland	2,819
St. Andrew	2,586
St. Ann	2,234
St. James	1,943
St. Thomas	1,536
Trelawny	767
St. Elizabeth	241
Westmoreland	212
Hanover	88
	40,028

Of this total, 1,055 are supplies for dead or unthrifty plants.

C. RESEARCH AND LABORATORIES.

(xi) *Report of the Deputy Island Chemist.*

The total number of samples analysed during the year ended 31st December, 1935, was 3,895 and compares with former years as under:—

1931.	1932.	1933.	1934.	1935.
2,573	3,286	3,905	3,639	3,895

The samples are classified as follows:—

"A" Official Samples.

(I) *Police, Criminal, and Toxicological—*	
Human Viscera and Organs	164
Stomach contents and washings	4
Vomits	12
Faeces	2
Animal Viscera (cows)	2
Substances and articles examined for poisons	160
Exhibits in Murder cases:—	
Shot guns	1
Revolvers and Pistols	5
Cartridges 4, Cartridge Cases 9	13
Bullets	3
Sticks, wooden clubs, and chips	9
Cutlass 1, Papers 2	3
Obeah Exhibits, liquids, etc.	4
Exhibits in cases of Criminal Abortion:—	
Medicines, Pills, Powders, etc.,	18
Under The Coining Laws.	
Coins, Genuine	271
Coins, Counterfeit	172
Bank and Currency Notes, Genuine	2
Counterfeiting Exhibits, moulds, etc.	141
Under The Dangerous Drugs Law.	
Opiums	85
Opium Exhibits, pipes, etc.	11
Ganga	557
Ganga Exhibits, pipes, rags, etc.	44
Tobacco and Tobacco Exhibits, pipes, etc., for Ganga	8
Under The Spirit License and Rum Duty Law.	
Rums	12
Spirits, Whisky, Gin, Wines, etc.	37
Bay Rums	2
Under The Medical Laws.	
Medicines, Herbs, Drugs, etc.	55
Under The Petroleum Laws.	
Kerosine Oils	6
Exhibits in Arson Cases:—	
Clothing 8, Burnt sacks and residues 11,	19
Gasolines	2
Miscellaneous:—	
"Charming" Powders	2
"Faked" Rums	16
Stolen Medicines	2
Total	1,844

(II) *Customs and Excise.*—	
Absolute Alcohols and Rectified Spirits	7
Denatured Alcohols	35
Native and Other Wines	25
Spirits, Rums, Rum Punches, Liqueurs, etc. ..	32
Bay Rums	2
Flavouring Extracts and Essences	86
Fuel Oils	58
Gasolines and Kerosines 7, Turpentines 1, ..	8
Insecticides and Disinfectants	9
Wood Preservatives	6
Fabrics, Silk, Cotton, etc.	192
Lubricating Oils	7
Condensed Milks	4
Chemicals	3
Miscellaneous:—	
Syrups 2, Wrapping Papers 2, Coins 2, Herbs 1, Biscuits 1	8
Total	482
(III) *Department of Science and Agriculture.*—	
Animal Viscera for poison	4
Milk Powders 2, Feeding Stuffs 1, ...	3
Minerals 2, Deposits 1, ...	3
Honey 1, Orange Oils 1, ...	2
Brines 3, Cattle Dips 1, ...	4
Tallows 2, Gas Oils 1, ...	3
For Chief Inspector of Produce.	
Gingers	5
Orange Oils	1
Total	25
(IV) *Island Medical Department.*—	
Feeding Stuffs "Nicolene"	1
Fresh Milks 1, Waters, potable 1, ...	2
Medical Officers of Health	
Kingston: Fresh Milks, Genuine, 1	
Kingston: Fresh Milks, Adulterated 4, ..	5
St. Andrew: Fresh Milks, Genuine 1,	
St. Andrew: Fresh Milks, Adulterated 1 ..	2
St. Catherine: Fresh Milks, Genuine 1,	
St. Catherine: Fresh Milks, Adulterated 1 ..	2
St. Elizabeth: Cod Fish	1
Manchester: Fresh Milks, Genuine 8,	
Manchester: Fresh Milks, Adulterated 1, ..	9
Trelawny: Deposit from Ice	1
St. James: Waters, potable	4
Total	27
(V) *Department of Public Works.*—	
Native Corns	157
Waters, potable	1
Lighthouse burning oils	1
Total ..	159
(VI) *Kingston and St. Andrew Corporation.*—	
Waters, complete chemical analysis, ...	2
Gas Coals 1, Gas Cokes 1, Crude Tars 2, Spent Oxides 1,	5
Total ..	7
(VII) *Water and Sewerage Board.*—	
Waters, complete chemical analysis	1
Total	1
(VIII) *Jamaica Agricultural Society.*—	
Cocoanut Meals 1, Cashew Nut Oil 1, ...	2
Feeding Stuffs, "Chufa"	1
Total	3
Total Official ..	2,548

"B." GENERAL SAMPLES.

Fresh Milks, Government Stock Farm	1,025
Fresh Milks, Private Persons	7
Cattle Dips	59
Sugars	75
Rums	66
Waters, Potable	9
Edible Oils 4, Essential Oils 2, ...	6
Alcohols 1, Rum Punches 2, Bay Rums 1, ..	4
Flours 7, Corns 3, Rice 1, ...	11
Fruits 4, Vinegars 3, ...	7
Coconut Waters 1, Coconut Press Cakes 4, ..	5
Animal Viscera for poison	3
Substances for Poison:—	
Horse salivas and swabs for "dope" ..	16
Foodstuffs 2, Urines and Bloods 4, ...	6
Plants and Weeds 2, Powders 1, Liquids 1, Substances purchased as Salt 2, ..	6
Instruments for test and calibration	13
Ores, Minerals, and Deposits	8
Hops and Bagging	3
Lubricating Oils	2
Distillery Washes	2
Medicines	2
Telephone Cables	2
Standard Solutions for Check	2
Miscellaneous:—	
Aerated Waters 1, Butters 1, Liquid for Ageing Rum 1, Soaps 1, Artificial Manures 1, Liquid Gases 1, Steam Coals 1, Branding Fluids 1, ..	8
Total ..	1,347
Grand Total	3,895

The 164 analyses of human viscera and organs, 4 stomach contents and 12 vomits, were made in connection with 84 deaths. In 50 cases results were obtained in the viscera, etc., as follows:—

(1) 0.03 grains Hydrocyanic Acid from the organs of a male adult.
(2) Large traces Hydrocyanic Acid from the organs of a male adult.
(3) 0.053 grains Phosphorus in the viscera of a female adult.
(4) Large traces of Hydrocyanic Acid from the organs of a female adult.
(5) 0.006 grains Phosphorus in the viscera of a male child.
(6) 0.039 grains Phosphorus in the viscera of a female child.
(7) 0.025 grains Phosphorus in the viscera of a male child.
(8) 0.015 grains Phosphorus in the viscera of a male child.
(9) Ptomaines from the organs of a male child.
(10) Ptomaines from the organs of a male child.
(11) Ptomaines from the organs of a female child.
(12) Large traces of an organic substance resembling Pictrotoxin from the viscera of a female adult.
(13) 0.2 grains Oxalic Acid from the viscera of a male child.
(14) 0.0026 grains Arsenic from the organs of a male adult.
(15) 0.0023 grains Arsenic from the organs of a female adult.
(16) Ptomaines from the organs of a female adult.
(17) Traces Hydrocyanic Acid from the organs of a female adult.
(18) Traces Ptomaines in the viscera of a male child.
(19) 1.5 grains Carbolic Acid from the organs of a female child.
(20) Traces Arsenic and Ptomaines in the viscera of a male child.
(21) 0.0005 granins Arsenic in the viscera of a male child.
(22) Large traces Hydrocyanic Acid from the viscera of a male adult.
(23) 0.7 grains Arsenite of Soda from the organs of a male child.
(24) 0.021 grains Arsenite of Soda from the organs of a female adult.
(25) 27 minims Alcohol from the stomach of a male adult.
(26) Large traces Arsenic from the organs of a female adult who had been treated with Salvarsan injections.
(27) 0.825 grains Phosphorus from the organs of a male adult.
(28) 2.13 grains Arsenic and Cresols from the organs of a female adult suicide.
(29) 3.19 grains Mercury from the viscera of a male adult.
(30) Large traces Hydrocyanic Acid from the organs of a male adult (Cassava poisoning).
(31) Large traces Kerosine Oil from the stomach of a female infant accidentally poisoned.
(32) 27.46 grains Alcohol from the stomach of a male adult.
(33) 0.412 grains Phosphorus from the viscera of a male adult.

(34) 0.495 grains Phosphorus from the viscera of a female adult.
(35) 0.099 grains Phosphorus from the viscera of a male adult.
(36) 0.132 grains Phosphorus from the viscera of a female child.
(37) 0.082 grains Phosphorus from the viscera of a female child.
(38) Traces of Ptomaines from the organs of a female adult.
(39) Cresols equivalent to 1 oz. Lysol from the viscera of an adult female suicide.
(40) Traces Hydrocyanic Acid from the organs of a male child.
(41) Traces Hydrocyanic Acid from the organs of a male child.
(42) 3 grains Cresols from the viscera of a male adult.
(43) Large traces Hydrocyanic Acid from the viscera of a female adult.
(44) Large traces Hydrocyanic Acid from the viscera of a male adult.
(45) 0.06 grains Arsenic from the organs of a male adult.
(46) Large traces Hydrocyanic Acid from the viscera of a female adult.
(47) Large traces Ptomaines from the organs of a female child.
(48) Large traces Ptomaines from the organs of a female child.
(49) 0.015 grains Arsenic and large traces Lead from the viscera of a female adult.
(50) Large traces Hydrocyanic Acid from the viscera of a male infant.

38 substances and articles examined for poisons gave results as follows:—
(1) 2.5 grains Calomel in a powder suspected as causing death.
(2) Powdered glass and Limestone in a water.
(3) Indelible pencil shavings in cooked rice.
(4) Alum in salted fish.
(5) 100 grains Arsenic in Salt.
(6) Arsenic in a drinking water.
(7) 19 grains Arsenic in $1\frac{3}{4}$ ozs. Coffee.
(8) Large traces Phosphorus on a spoon.
(9) 0.6 grains Phosphorus in cooked food.
(10) Iodine in a phial in connection with an attempted suicide.
(11) Iodine in a tumbler used in an attempted suicide.
(12) Cleansing powder similar to "Dutch Cleanser" in a suspected powder.
(13) "Dumb Cane" juice in water.
(14) "Dumb Cane" extract in a glass.
(15) Frankincense and seeds of "Grains of Paradise" in alcohol.
(16) 30 grains powdered glass in drinking water.
(17) 32 grains powdered glass in a dumpling.
(18) 15 grains Potassium Permanganate in a liquid used by an attempted suicide.
(19) Large traces Arsenite of Soda in cooked food.
(20) 33.3 grains Mercuric Chloride in $4\frac{1}{2}$ fluid ozs. of a liquid prescribed as medicine.
(21) 5.4 grains Arsenite of Soda per pint in water.
(22) 6.6 grains Arsenite of Soda per pint in water.
(23) Large traces of Arsenic in a calabash suspected to have been used to contain this substance.
(24) Small fragments of broken glass in coconut cake.
(25) Black Musk in a suspected "Obeah" powder.
(26) Acetate of Lead in a powder used in an attempt at poisoning.
(27) Acetate of Lead in Condensed Milk.
(28) Oil of Cinnamon and Black Musk in an "Obeah" liquid.
(29) 2 grains finely powdered glass in a Mug.
(30) Large traces finely powdered glass in a tumbler.
(31) Large traces Phosphorus in a drinking water which caused four deaths.
(32) Large traces Phosphorus in a drinking water container.
(33) 64 grains powdered glass in cooked food.
(34) Large traces finely powdered glass in a Mug.
(35) Large traces finely powdered glass in Tea.
(36) Traces of Phosphorus on the blade of a pocket knife.
(37) Arsenic and a red aniline dye in rice and peas.
(38) 1.37 grains Boric Acid per pint in Fresh Milk.

Police.

395 Certificates were issued to the Police Department, being a decrease of 22 from last year, but an increase of 26 over 1933.

The examination of fire arms, bullets and cartridges in cases of murder and shooting with intent continues to form an important branch of investigation and steps are being taken to equip the Laboratory with the most efficient instruments for this kind of work. In five out of six cases investigated during the year it was possible to prove that the fire arms had been used for firing specific bullets. In the other case a shot gun had been so carefully cleaned and oiled before it was brought for examination that chemical tests were negative and in the absence of used cartridge cases no conclusions could be drawn.

Examination of exhibits in Obeah cases showed that they consisted of strong smelling preparations of essential oils, cinnamon and musk.

Substances used in attempts to procure abortion comprised preparations of quinine, iron chloride, ergot and alum.

A total of 586 articles submitted in connection with breaches of the Coin Law included 172 Counterfeit coins and 141 articles for use in making base coins, such as moulds, metals, chemicals, etc., and legal pro-

ceedings followed in 35 cases. Judging from similarities between base coins uttered by different persons it would appear that in some cases the coins are made at one place and distributed for circulation amongst confederates. In one case where the coins were found to be made in Kingston by some members of a family it was proved that other members of the same family took base coins to St. Ann for uttering there. The utterers were apprehended and sentenced in St. Ann's Bay and the coining tools found in Kingston were seized.

The practice of hardening base coins and silver plating them appears to be growing and large quantities of such dangerous substances as Potassium Cyanide and Nitric Acid are common articles amongst the exhibits seized by the Police.

Opium and opium exhibits numbered 96 this year being 40 more than last year. A large number of folded newspapers and letters which were seized in the post were found to contain packets of opium wrapped in waterproof material.

Ganga and articles used in the smoking of Ganga showed a decrease from 722 for last year to 601 for this year.

Under the Spirit License Law 51 samples were received, this is an increase of 28 more than last year, but is still less than the number received in former years.

Exhibits for Breaches of the Medical Laws showed a decrease from 97 to 55, and either offences against these Laws are becoming fewer or more difficult to detect.

Arson Exhibits numbered 21 and comprised papers and cloth which had been treated with inflammable petroleum.

Sixteen liquids sold as Rum were analysed and found to be coloured water or mixtures of coloured water and rum, and proceedings were taken against the vendors for obtaining money by false pretences.

Customs.

The work done for the Customs Department showed an increase this year, 482 samples being anlaysed as against 406 for the previous year. The increase is largely due to the greater number of samples of textiles submitted, these numbering 192 as against 10 for last year. The use of polarized light for microscopical examination of fibres together with determination of the protein content by a standardised chemical method enables a report on samples to be made the same day they are received thereby effecting a saving of time in issuing reports.

For the Department of Science and Agriculture 25 miscellaneous analyses were made, being a decrease of 8 compared with last year. An investigation was carried out on the moisture content of Ginger, with a view to ascertaining the relationship between keeping qualities and moisture.

For the Island Medical Department 27 samples of Waters and Foodstuffs were analysed. Out of 18 samples of abnormal milk submitted 7 were found to be adulterated, being 39% approximately.

Of 159 samples submitted by the Department of Public Works, 157 samples were of Native Corn. The quality of Native Corn has shown considerable improvement during recent years.

The Kingston and St. Andrew Corporation submitted 7 samples of which 2 were of water from new sources for the increase of Public supplies. The other 5 samples were materials from the Gas Works.

The other Official samples were mostly such as involved routine work and call for no particular comment.

59 samples liquids from Dipping Tanks were tested and the usual recommendations made for bringing tanks to correct strength.

Although Rum samples only numbered 66 as against 81 for last year yet these included more time as the analyses were more involved owing to the new specifications in the United States and elsewhere which call for the determination of constituents not formerly reported such as sugars, colouring matter and amyl alcohol.

Sugars showed a decrease, being 77 as against 129 for last year. This appears to be due to the fact that several sugar estates now have their own Chemists who attend to the routine tests and only submit occasional samples.

Seven samples of Flour and three samples of Hops were submitted for analysis to ascertain whether they were damaged by sea water. In all cases it was found that sea water was not responsible, and that the damage was caused by faulty packing of damp materials.

An investigation was made to ascertain the cause of failure of two telephone lead cables and it was found that lead boring insects, probably duck ants, had perforated the lead covering thereby causing a short circuit.

Eight samples of ore were anlysed and assays for copper and silver were carried out.

Of eight miscellaneous analyses one called for the analysis of commercial ethylene to ascertain the purity, and also the cause of a peculiar odour therein.

A specimen of fluid used for branding cattle in place of the usual hot branding iron consisted of cresylic acid.

The manufacture of Paranaph and Fly Killer was continued throughout the year, and the sale of these articles to the public has shown an increase over last year.

2,187 Letters, Orders, etc. (a decrease of 48 from last year), were received and dealt with during the year. This number is not inclusive of personal orders dealt with.

General Analyses "B".

Out of 1,347 samples analysed under this head 1,025 consisted of samples of milk from the Government Stock Farm and 7 from private dairies. The average quality of milk from these sources was very good, and well above the legal standards.

The following table shows the nature and amounts of materials supplied to the public for the past five years, also the amounts collected in fees and for sales during the same period.

Items.	1931.	1932.	1933.	1934.	1935.
Paranaph ..	33,770	34,964	39,850	33,373	36,654 lbs.
Arsenite of Soda	25,499	22,021	24,818	20,300	21,200 lbs.
Copper Sulphate	160	567	8	4	.. lbs.*
Carbon Bisulphide	669	1,174	2,010	1,164	1,338 lbs.
Rat Poison, bulk	175	225	210	130	183 lbs.
Rat Poison, 1 oz. packets	169	170	nil.	550	301 pkts.
Thymol Powders	199	441	393	248	167 ozs.
Standard Iodine Solution	39,000	40,750	45,000	34,500	36,000 c.c's.
Starch Solution	221	209	245	196	187 bottles
Soda Bicarbonate	52	30	44	31	42 bottles
Cyanogas ..	170	42	29	25	273 lbs.
Fly Killer	53	132	229	332	349 gals.
Laboratory Fees	£191 18 0	£221 10 9	£179 8 0	£240 1 0	£143 9 0
Laboratory Sales	£989 10 7	£928 13 11	£1,073 8 2	£923 19 0	£996 6 1

Remarks.—Sale discontinued.*

During the year Mr. W. L. Barnett, Deputy Island Chemist, acted as Director of Agriculture and Island Chemist, from 9th July until 8th November, and during this period Mr. E. N. Richards acted as Deputy Island Chemist.

Mr. L. A. Boothe, Clerk and Storekeeper, was absent on vacation from 2nd July to 1st October, during which time Mr. D. C. Davis, Technical Assistant, carried out the duties of Acting Clerk and Storekeeper.

The staff of the Chemistry Department remains the same as last year, and consists of the Deputy Island Chemist, Assistant to the Deputy Island Chemist, two Technical Assistants, three Apprentices, and Clerk and Storekeeper.

W. L. Barnitt, M.A., B.Sc., F.I.C.,
Deputy Island Chemist.

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General.

As a result of the Agricultural Development Programme instituted in 1933 for the purpose of offsetting the damage cause by Panama Disease of bananas and the diversification of Jamaica's export products, the duties attached to the office of Microbiologist have been materially expanded during 1935. On return from leave in England in January, immediate steps were taken, with the wholehearted support of the Director of Agriculture and the Advisory Committee on the Banana and Citrus Industries, to embark upon experimental marketing of minor products such as vegetables, the exportable possibilities of which had been investigated in Covent Garden and other English markets during 1934. At the same time construction work began on the Experimental Cold Storage plant and Packing House at the Kingston Pen site.

2. The new Low Temperature and Marketing Station was opened on May 23rd, 1935, and from that date the Microbiologist was officially stationed in Kingston while still retaining certain Laboratory accommodation at Hope. The new offices originally consisted of a small laboratory and office with a miniature Packing House attached in association with the Cold Storage plant. The latter consists of four insulated rooms of 750 cubic feet each, approached by two well-sized air locks. The machinery was supplied by Messrs. J. & E. Hall of Dartford, England, and consists of duplicate Ammonia compressors driven by 10 B.H.P. electric motors. The chambers are cooled by continuous air circulation through false walls which are perforated at regular intervals. The fans draw the air through specially constructed coolers, one for each chamber, and temperature control is effected by thermostatically controlled brine, the flow of which can be regulated either by hand or automatically by another thermostat which operates an automatic brine valve in the cooler itself. Humidity control, when desired, is effected by a double thermostatic arrangement in the cooler, which permits of supercooling the air and then heating to the desired temperature after excess moisture has been deposited on the brine coils.

3. The accommodation provided soon appeared inadequate and additions to the office and Packing House were provided. The scope of work expanded even more rapidly and it was decided to operate the Cold Storage Plant and Packing House not only for experimental work but also on the lines of a Government Marketing Agency to handle exports of new agricultural products for those growers who were prepared to share with the Department in exploration of overseas markets. At frequent intervals other new work has been added and at the end of the year the new office was being operated as a Marketing Division of the Department of Agriculture in all but name, while plant import and export inspections, experimental plots with vegetables and certain other new crops, overhead irrigation and Citrus Development Loan work had also been brought under its control.

4. In spite of this additional work, the routine advisory services in connection with plant diseases were maintained and normal investigations continued. We were fortunate in having the services of Dr. J. D. MacLachlan of Harvard University for some months. Dr. MacLachlan made a special study of the Pimento Rust, the plant disease problem of the moment needing detailed and concentrated work. The report of the very thorough and detailed work of this investigator will be published elsewhere.

5. In order to overtake the ever-increasing work, several additions to the staff were made durng the year. Mr. R. C. Bridge joined Mr. Z. Daniels as Technical Assistant in connection with Packing House and Cold Storage work. Messrs. J. M. McEwen, A.I.C.T.A., and Mr. H. C. Miller, A.I.C.T.A., were transferred from the Agricultural Society and undertook the plant inspections and experimental plots

respectively, while Mr. E. C. Tai, A.I.C.T.A., joined the staff towards the end of the year and assisted with spraying trials and plant disease work. Mr. N. E. C. Thomson, Inspector of Plant Diseases, was seconded half time for three months to assist with the preparation of the vegetable plots. Mrs. B. Vernon was appointed to assist with the citrus development loan work. I desire to record my sincere appreciation of the unstinted services given by these officers, especially in connection with the experimental marketing programme and Packing House work which has entailed long hours over considerable periods, frequently under trying conditions. I cannot speak too highly of the enthusiasm and sense of duty displayed by these officers. In emergencies, the assistance rendered by Messrs. Braham and Squire of the Jamaica Citrus Producers' Association Ltd., has been invaluable, while the officials and employees of both the Jamaica Banana Producers' Association Ltd., and Messrs. T. J. Poupart Ltd., of Covent Garden have played a most important part in market development work in England. It may not also be out of place to express gratitude for the interest, helpful criticism and guidance given to the new development both by the Director of Agriculture and the Administration.

Committee Work.

6. The Microbiologist was called upon to serve on several Committees during the year. The secretarial duties of the Advisory Committee on the Banana and Citrus Industries were continued; and during the leave of absence granted to the Director of Agriculture, the Microbiologist was appointed to act as Chairman. He was also appointed to act as member of the Advisory Board under the Agricultural Produce Law during the same period. The Microbiologist was also appointed to act, and afterwards was confirmed, as Chairman of the newly appointed Citrus Development Loan Board for granting loans under Law 31 of 1935 to assist planters to establish citrus groves. The secretarial duties connected with the operations of this Board were also carried out by the Microbiologist and his assistants. The same officer continued to be member of the Banana Industry Aid Board which was reappointed to administer new loans under Law 24 of 1935 and continued its activities under Law 15 of 1932 and Law 25 of 1933. As a result of the Committee of Enquiry which dealt with the affairs of the Jamaica Citrus Producers Association Ltd., the Microbiologist was appointed as Government Representative on the Board of Directors and Executive of this Association. He also had delegated to him special negotiations for the allocation of the market for locally manufactured coconut oil on a quota basis. During the absence of the Director of Agriculture, considerable time was also spent by the Microbiologist in the somewhat protracted negotiations concerning the marketing of bananas, which ultimately led up to the appointment of the Jamaica Banana Commission. On December 28th the Microbiologist left on a short visit to Canada to investigate market problems with citrus fruit and the effects on this trade produced by the Canada-United States Trade Agreement.

7. While it cannot be denied that these numerous calls for special services necessitated a certain amount of curtailment of experimental work, a considerable portion of the original programme was carried through by the officers of the Division and results of some importance were obtained. Delay in getting results tabulated and prepared for publication was inevitable under the circumstances and it is apparent that experienced assistance not only for the plant pathological work but also for the ever increasing office work will have to be provided at a very early date if reasonable efficiency and investigational programmes are to be maintained.

Plant Diseases.

8. Panama Disease of bananas and Pimento Rust continued to be the major plant disease problems of the moment, while Mosaic Disease of sugar cane and Bud Rot of coconuts came into greater prominence than for many years previously. With the sustained interest in the citrus industry and the development of new crops, increased interest in plant disease might well be expected and numerous enquiries have been received on these subjects.

9. *Panama Disease of Bananas.*—The full details of the incidence of the disease are given as issued in the report of the Secretary of the Advisory Committee on the Banana and Citrus Industries. (Appendix to this Report). The total number of diseased trees reported reached a new high record of 415,931 for all parishes excluding Portland. This represents an increase of 56% on the total for 1934 and a little over the usual increase averaged over a period of 15 years. The decision to permit modification of the treatment of the disease to 1-root treatment throughout the Island, at the discretion of the officers of the Department of Agriculture, was put into operation during the year, but it is yet too early to judge what the ultimate effect will be. It is clear, however, that there has been a satisfactory reaction by planters, both large and small, to the institution of this system, and treatment of the diseased trees on the first exhibition of symptoms is now carried out voluntarily with much greater expedition and regularity. The greatest increase in the incidence of disease occurred in St. Mary where sources of infection are the greatest and where wholesale neglect of treatment was becoming apparent prior to action being taken in 1934 to modify the regulations in the parish. It is estimated that 11,600 acres of banana lands have now been lost in that parish between quarantined plots and abandoned areas, and the total land lost in the whole Island is conservatively estimated at 32,000 acres. This loss has been offset by new plantings but the loss of large areas of the best alluvial soils in the river valleys and level lands, due to the wholesale dissemination of infection by flood water, is now becoming a matter of ever increasing importance which must ultimately have a serious influence on the general grading of the Island's fruit.

10. Investigations with new and other varieties resistant to Panama Disease, which might be suitable for partial replacement of the Gros Michel as a commercial banana in those districts where Panama Disease has caused wholesale abandonment of land, were continued in collaboration with the Supervising Inspector of Plant Diseases and the Geneticist. These two officers have continued to deal with the plant breeding and field trials while the Microbiologist has undertaken the testing of the qualities of these various varieties in regard to ocean transport and ripening under normal commercial conditions. Details of this experimental work are given later in this report under another heading.

11. *Other Banana Diseases.*—As usual, occasional cases were reported of Bonnygate Disease and Marasmius Root Rot.

Sugar Cane.

12. *Root Diseases.*—The usual number of complaints concerning these diseases were received from areas where drainage and other important factors had not been adequately attended to. On the whole, however, these diseases were not of outstanding importance during the period under review.

13. *Mosaic Disease.*—Mosaic disease came into prominence, especially in the parish of Westmoreland, where in some districts strict observance had not been continued of the regulations prohibiting the growing of corn (maize) in association with sugar cane. Some large planters, as well as small settlers, had been negligent in this matter and a firm line of action was necessary in some cases. Mosaic disease was also much more apparent than for some considerable time in certain areas in St. Ann and St. James, and it appears that the time is ripe for a drive to enforce roguing and proper precaiutions in connection with this disease, similar to that carried out in the years 1923-24.

Coconuts.

14. *Bud Rot:*—The cumulative effect of the series of hurricanes which have visited the Island since 1932 has shown itself in sporadic cases of Phytophthora Bud Rot all over the Island. In most cases the disease has been quickly and carefully attended to, and there seems no prospect of this form of the disease reaching epidemic proportions in the way in which it did after the hurricanes which visited the Island during the period 1915 to 1918. In the coastal belt of St. James, however, a considerable loss of trees has taken place from a form of Bud Rot not caused by Phytophthora. The area involved is long and narrow as the disease does not appear to have affected trees which are more than four or five miles from the coast line. Special measures have been taken to assist the local Plant Disease Inspector in keeping treatment of the diseased trees up to date.

15. *Leaf Diseases:*—The peculiar leaf diseases which were causing a great deal of alarm and apprehension in the St. Mary district have, as predicted, slowly but surely decreased. Similar troubles, however, have arisen in St. Ann and parts of Trelawny; and it is apparent that in many areas where the rainfall is either small or badly distributed, and where soils are not altogether suitable for this crop, the economic life of coconut trees is not likely to exceed 30 years. It is very noticeable in such districts that after the 20th year leaf troubles of various sorts begin to appear, and unless it is found possible to aid the growth of the tree by means of cultivation and drainage, these leaf diseases may well ultimately develop into "Pencil Point" which makes the tree quite valueless and results in ultimate death. This state of affairs is apparent in certain districts in Trelawny.

Citrus.

16. As a natural outcome of the development work with this crop, added interest has become apparent in the diseases, not only of the tree itself but also of the fruit when under transportation to overseas markets. With the almost universal use of sour orange stock, especially on the heavier soils, very little trouble has developed from the various forms of gumming disease and it is satisfactory to note that diseases on the whole are singularly absent from the young trees which have been developed from the Government nurseries. In some instances, however, young trees of two to four years of age, where soil conditions are not what they should be, have developed some signs of withertip and ammoniation. Proper attention to to drainage and cultural conditions have in most cases rectified the trouble and special trees are receiving soil treatment with copper sulphate with a view to observing the reaction from this chemical.

17. Penicillium rots have been apparent in fruit prepared for shipment when careless handling and undue delay in removing the fruit from the field to the Packing House has taken place. These diseases have also been apparent in the fruit when it is harvested during wet weather. *Oleocellosis* or Water Blister was also very frequent in such cases, and it is apparent that great care should be taken in harvesting fruit in the Autumn months and to wilt it properly before it is packed.

18. Stem-end rot caused by *Diplodia Natalensis* is now a minor problem in connection with the shipping of fruit as compared with what is was some years ago. The application of the debuttoning system prior to shipment has largely eliminated this disease. In some instances, however, where the debuttoning is carried out in a careless manner and damage results to the tissues around the button scar, wound parasites such as *Oospora* and *Colletotrichum* have caused secondary infections. Some damage has also been observed through *Collectotrichum* entering the fruit at the button end and causing a dry superficial rot in that zone. These matters are all under investigation and it is anticipated that some fairly large scale experiments will be carried out during the 1936-1937 season.

19. Knot Disease (*Sphaeropsis tumefaciens*) of limes and lemons has been brought to attention on several occasions by growers on the North side of the Island. In view of the fact that so many of the limes grow in a semi-wild state, it is very difficult to obtain satisfactory control of the disease. There is no doubt that trees will respond to a large extent to the cutting out of the diseased tissues, provided such material is immediately destroyed by fire and the quantity of infection reduced, but on the whole such control measures are only instituted in a half-hearted fashion and reinfections on the new growth are very common. With the increasing importance of the lime industry it is desirable that this disease should receive further attention and research but this can only be done when the Department is more adequately staffed.

20. Scab Disease has, as usual, been common in sour orange nursery stock but has continued to respond very well to the application of semi-shade conditions during the early growth of the seedlings.

Pimento.

21. Rust (*Puccinia Psidii*):—This new disease which suddenly appeared in a matter of a week or two in epidemic form over an area covering some 400 square miles in Manchester and St. Elizabeth in April, 1934, continued its activities in an equally virulent manner during 1935 and was identified in practically every parish of the Island. The origin of the disease is likely to remain a mystery but it is an outstanding example of the extraordinary damage which can be produced by the group of fungi known as the *Uredineae*. Until 1934 the Pimento tree (Pimenta officinalis), so far as it is possible to ascertain, had been free from any serious diseases. It is true that from time to time trees had died from infection of the root system by the higher Basidiomycetes but such cases had been occasional and with few exceptions the damage was negligible. At the end of March, 1934, there was every indication of a record crop of pimento, when, without warning, this new disease suddenly appeared over this very considerable area just after the trees had blossomed, and resulted in decimation of the crop in that locality. Young shoots, leaves and berries were affected and in a short time many trees were defoliated of their new crop of leaves. The previous year's leaves however, were not affected and remained.

22. There was some doubt as to the identity of the fungus at first but Miss Wakefield of Kew Herbarium finally identified the pathogen as *Puccinia Psidii* Wint, a fungus which was commonly known in Jamaica on the Roseapple (*Eugenia Jambos*) but which had never previously been known on Pimento. *Prima facie* it would appear that the Roseapple rust had mutated, producing a "sport" which was peculiarly adapted to the Pimento plant. Further light, however, will be thrown on this point by the researches of Dr. MacLachlan.

23. By 1935 the disease had appeared throughout the Island and it was observed that the greatest damage was produced in the higher elevationss of Manchester, St. Elizabeth and St. Ann. It should be mentioned that the Pimento tree produces the greatest portion of its foliage during the Spring. These leaves are carried for two years so that normally a tree carries two seasons' leaves all the time, the two year-olds falling in the Spring when their place is taken by the new crop. It was soon apparent that only young growth was infected and, where such infection was at all severe, defoliation of the young leaves was produced. Thus the 1934 crop of leaves was almost entirely lost in the first attack of the disease in the Manchester—St. Elizabeth area, and following an equally severe infection in 1935 the trees in this zone were practically without any leaves by May of that year.

24. The Pimento tree being a wild plant, never planted in groves but growing naturally in pastures and bush, it was quite apparent that the institution of direct control measures, such as spraying, was neither feasible nor economic. It could, therefore, only be hoped that the disease would starve itself out by the loss of host material through defoliation of the trees. Unfortunately, odd flushes of new growth were sufficient to maintain the parasite in an active form and it yet remains to be seen to what extent the Pimento industry will ultimately be damaged by this new parasite.

25. Through the influence of Dr. Faull of Harvard University, who paid one of his periodical visits to Jamaica in 1935, the Department was able to secure the services of Dr. J. D. MacLachlan, a Harvard Research student who had specialised in Rusts and had been granted a travelling Fellowship. The report of this investigator's researches over a period of seven months in the Colony will shortly be published. He has shown by inoculation certain important points in regard to the host range of the strain of *Puccinia Psidii* infecting Pimento but the actual origin of this particular strain of the fungus still remains a mystery. Further research work may ultimately reveal its origin. The most important feature of Dr. MacLachlan's researches, however, are concerned with the temperature relationships connected with Uredospore germination, which tend to indicate that low night temperatures during Winter and Spring, in the higher elevations. have a great influence upon the amount of the infection which takes place, and in consequence the outlook for pimento growers in the higher altitudes of Manchester and St. Ann is far from bright. It is yet too early to give up hope of an improvement in the situation in these districts but no security can be felt as to the crop in thsese areas in the immediate future. Whether a series of favourable weather conditions will ultimately ease the situation yet remains to be seen, but the future for the penkeepers and smaller growers in these zones cannot be visualised with any great degree of optimism at present, and any direct means of control appear to be out of the question due to the nature of the Pimento tree and its very wide distribution in pastures and bush alike.

Other Crops.

26. The newly developed interest in vegetable growing has brought to light many important disease problems which call for special study. These diseases have been invesgtiated to some extent in the past year but it is becoming increasingly obvious, as in the case of Pimento Rust, that if any pretence to thorough investigation is to be made, ample and thoroughly qualified assistance will have to be provided, and such officers must be unfettered by special extraneous duties. Research work on plant diseases cannot be carried out in odd moments but has to be planned so that other matters do not interfere. With the active agricultural development policy which has been insitututed, especially in regard to new crops, plant disease problems will naturally become more and more important each year. Routine advisory work can be maintained but a serious situation is likely to arise if a sufficiency of fully qualified technical staff is not provided very soon, and for such investigations men with some research experience are essential. The Tobacco development work alone is likely to produce disease problems sufficient to occupy the whole time of one investigator for several years, if the disease problems which can be predicted with the greatest certainty are to be dealt with in a satisfactory manner.

27. *Tobacco:*—Fungus diseases in general were not very prevalent but the usual heavy infection of Mosaic diseases of various kinds appeared in ratoon crops. In such places where plants of the Virginia type were grown, damage from Mosaic were still more pronounced. A complete analysis of the various types of virus diseases which occur on tobacco in Jamaica has not been made but it is apparent that if any development work is to be done with this crop, a careful study of these various diseases will be essential.

The prevalence of virus diseases of various kinds amongst Solanaceous and other kinds of weeds indicates the absolute necessity of clean cultivation in tobacco growing, and the investigation of the inter-relationship between these diseases on wild and cultivated plants is a matter which would undoubtedly yield valuable information in regard to the general control of infection.

28. *Eggplants:*—This crop received special attention from the Winter of 1934 when commercial cultivation was instituted with a view to experimental exports. In that year very little disease appeared on the plants themselves, although odd cases of infection of the fruit by *Phomopsis vexans* were observed The chief troubles in that year, however, consisted of damage from Root Knot (*Heterodera radicicola*),. a subject which has been under investigation by the Entomologist. In association with infestation with ants, a somewhat obscure trouble causing "barking" of the collar was also observed. This and other diseases and troubles which have developed subsequent to the 1933-34 experiments are now under investigation.

29. *Sweet Peppers* (*Capsicums*):—This crop was also grown on a commercial scale for export, and suffered to a greater extent from diseases than the Eggplant crop. Mosaic disease especially was of considerable importance in the lowlands although less apparent at the higher elevations. Fruit rot caused by the Anthracnose fungus (*Colletotrichum nigrum*) and certain other fruit rots were apparent in the field especially where the fruit touched the ground or was splashed by irrigation water. These diseases are also under investigation. Pepper fruits when exported in Cold Storage showed a suprisingly small amount of wastage from fungus causes, but if reaped when wet or if the fruits were subsequently wetted for the purpose of cleaning before packing, rot invariably set in, starting from the vicinity of the stem.

30. *Tomatoes:*—When grown on the lowlands this crop is invariably more susceptible to the various forms of Mosaic disease than when grown on the higher elevations. Late Blight (*Phytophthora infestans*) was less common at the lower levels where temperatures are, generally speaking, too high for the parasite. At the higher elevations, however, both *Phytophthora* and *Cladosporium* (Leaf Mould) were quite common and, where conditions were suitable, resulted in considerable damage. On the whole the English varieties of tomatoes show much more marked resistance to fungus and virus diseases than the American varieties, but while the former may be suitable for canning and juicing purposes, there seems no prospect of growing them profitably for export as fresh fruit. Further investigations, therefore, into the diseases of the American varieties were instituted in the season of 1934-35 and indications of suitable measures of control for *Cladosporium* appear to be likely.

31. *Irish Potatoes:*—The principal diseases of this crop, as usual, have been Late Blight (*Phytophthora*) Early Blight (*Macrosporium solani*) and Common Scab (*Actinomyces scabies*). In the case of the two former diseases, ready response has always been found to regular and frequent sprayings with Bordeaux Mixture, and wherever spraying or dusting has been carried out according to instructions, these diseases have been of minor consequence. Scab also has only occurred in those soils deficient in humus, and the use of pen manure and green dressings has been advocated between crops of potatoes. It is pleasing to note that neither Corky Scab (*Spongospora subterranea*) nor Wart Disease (*Synchytrium endobioticum*) have yet appeared in Jamaica and the continuation of the restriction of the importation of seed potatoes, except by permit from the Director of Agriculture, and on condition that they are duly certified in their country of origin, is likely to maintain freedom from these two important diseases. With the exception of a few potatoes imported for experimental purposes, all of the seed potatoes used in Jamaica have come from Canada or Great Britain.

32. The usual enquiries concerning diseases of garden crops have been received and dealt with. Nothing new or of serious consequence has come to light during the year. A more thorough study of the various vegetable diseases will be carried out during 1936 and it is anticipated that a report in greater detail will be possible in 12 months time.

33. *Orchid Raising*:—The work of raising orchids from seed by Asymbiotic methods which was instituted in 1928 has now been discontinued through pressure of other work. It is pleasing to note, however, that the plants which were raised in the microbiological laboratory some years ago have now developed extraordinarily well under the supervision of Mr. Downes, and some of them should reach the flowering stage during the next two years. These plants are the progeny of good varieties and the several thousands of plants which have been produced should be a valuable asset to the Horticultural section of the Department in the near future.

Agricultural Development Work.

34. *Vegetable Experiments:*—As a result of the investigations made in Covent Garden in 1934, the supervision and operation of experimental plots in connection with commercial vegetable and minor products was placed in charge of the Microbiologist, and Mr. H. C. Miller was the field officer allotted to this particular work.

35. *Eggplants:*—A plot of approximately two-thirds of an acre was planted out on a piece of leased irrigated land on the Liguanea Plain, and planted with the two varieties "Fort Myers Market" and "Florida Highbush." Although these plants showed a high infestation with Root Knot Eelworm, the yields were quite satisfactory, though the period of full production of best-class fruit was appreciably reduced by the attack of the Nematode. Pruning and top-dressing with a mixed fertiliser during the second month of harvesting did not result in any appreciable improvement, and indications of the experiment were to the effect that, on this type of land, when heavily infested with Eelworm, it is unlikely that more than a short crop can be obtained. It is, therefore, desirable to manure at planting time and again when flowering first begins, so that the plant may be induced to maximum effort in its early stages. Further studies on this feature of Eggplant cultivation are being carried on at the time of writing this report and the results will be discussed in detail when the 1935-36 experiments have been completed.

36. The plot of two-thirds of an acre yielded altogether 329 small crates and 83 large crates, the fruit varying in size from 46's and 32's in the small crates to 12's in the large crates. All these sizes proved acceptable in England although the greater demand appeared to be for the smaller sizes. The crop realised a total of £215 3s. 8d. in London; sales expenses were £30 4s. 6d. and shipping and packing expenses amounted to £75 6s. 11d., leaving a nett return of £109 12s. 3d. The average price realised was 9/1 for the small crates and 15/9 for the large crates, the maximum price being 12/- for the small crates and 30/- for the large crates. Apart from the fruit exported, rejections both in the field and the packing-house were very heavy towards the end of the crop. Rejections were made on account of deformity, poor colour, poor shape and damage, and brown spots on the skin mainly caused through mechanical damage during growth. Fungus diseases of the fruit were not of any great consequence. Cropping lasted from the last week of January to the last week of May; the bulk of the harvesting, however, took place in February and March, with a steady falling-off after the second week of April.

37. *Sweet Peppers or Capsicums:*—A small plot of Capsicums consisting of approximately one-fifth of an acre was also planted at the same place as the Eggplants. These were grown under irrigation but suffered severely from Mosaic disease and a number of fungus troubles which have been referred to in an earlier part of the report. Nevertheless, a reasonable crop was reaped from this planting, amounting to a total of 104 small crates and 3 large crates. The gross sales amounted in London to £64 10s. 4d. Selling expenses were £8 15s. 0d. and packing and shipping expenses £16 1s. 6d., leaving a net return of £39 13s. 10d. Produce sold at a fairly steady price between 10/- and 13/- per small crate of approximately 1 cubic foot. The plants were top-dressed from time to time with nitrogenous fertilisers of various kinds and it is apparent that the Sweet Pepper responds readily to nitrogenous top-dressings: the resulting fruit are heavier, larger and more abundant. Further work on this crop is in process during 1935-36 and will be reported upon later.

38. *Tomatoes*—A plot of Tomatoes was also grown on the same property on the Liguanea Plain as the Eggplants and Peppers. This plot consisted mainly of English varieties which were grown for the purpose of testing the possibilities of exporting tomatoes to the English market. Twelve varieties were planted from seed of the best strains obtainable, and one or two strains of the Canadian types. Each variety was planted in a solid block of one-tenth acre. Reaping of the crop commenced in February but it was found that a large proportion of the fruit showed splitting at the stem end and ripened unevenly. At that time also the Low Temperature Station was not complete and with only fortnightly shipping facilities to England, a great deal of the crop could not be shipped or utilised for experiment. The uneven ripening of the fruit may have been attributable either to Eelworm attack on the roots or unbalanced manuring, probably a combination of the two. Fruit was gathered at all stages of ripeness in order to ascertain the correct stage for shipment so that the product would be sufficiently ripe for sale on its arrival in London.

39. From a financial point of view the experiment was disastrous but sufficient data was obtained to indicate the lines on which further work should proceed, and the 1935/36 experiments have met with more success. Unfortunately, the very low price of Canary Islands tomatoes, with which the Jamaica tomatoes would have to compete, appears to preclude any possibilities of developing this trade.

40. The results will be dealt with in greater detail elsewhere, and it is perhaps sufficient to generalize at this stage. This experiment, coupled with previous experiments, showed that the English tomato varieties are less susceptible to disease on the Liguanea Plain than the American varieties; the soil and climatic conditions, however, tend to produce uneven colour in the ripe fruit and numerous blemishes which seriously increase the number of culls. On the whole, tomato growing appears more suited to the higher altitudes, and the prospects of successful shipments to the English market are now very remote owing to the low price at which the Canary Islands products are sold, in spite of a 10% preferential tariff. It is possible that the English varieties of tomatoes might have some usefulness for juice-making, should a canning industry ever come into being in Jamaica.

41. *Varieties grown and yield per plot of one-tenth acre. The percentage used locally includes a large proportion of ripes, the actual "culls" representing about 50% of this figure.*

Variety.	Total Yield.	Equivalent per acre.	Used Locally.
Potentate	825 lbs.	8,250 lbs.	63%
Ailsa Craig ..	623 "	6,230	80%
Experiment Station No. 1	899 "	8,990 "	69%
Sunrise ..	976 "	9,760 "	74%
Beecham Leigh	584 "	5,840 "	64%
Water Baby ..	587 "	5,870 "	58%
Riverside	698 "	6,980 "	57%
Buckley 1933 ..	512 "	5,120 "	67%
Best of all	427 "	4,270 "	64%
Comet	208 "	2,080 "	81%
Tuckswood	271 "	2,710 "	92%
Kondine Red ..	424 "	4,240 "	72%

The Canadian varieties, planted later, were an almost complete failure.

1935-36 Season Experiments.

42. On account of the satisfactory results obtained with shipments of Eggplants and Peppers to England in the Spring of 1935, a much more comprehensive scheme of experiments was planned for 1935-1936 and these were operated by the staff of the Low Temperature Station. Nurseries for such crops as Eggplants and Peppers were established at the Low Temperature Station so that they could have the maximum of supervision. Land for experimental plots was leased in a variety of situations so that a wide range of climatic and soil conditions could be covered. In addition certain planters established small plots in which the Department took interest and gave help whenever possible.

43. The results of the experiments will not be available until 1936 but on account of the desirability of disseminating information on the subject, a special report will be published during the Summer. Meanwhile a summary of the experiments only is given:—

The plots were established as follows:—

Place.	Area.	Elevation.	Soil Condition and Crops.
Liguanea Plain (Irrigated)	2 acres	Lowlands	Light gravelly soil with admixture of some clay: Eggplants, Beans, Sweet Peppers, Potatoes, English tomatoes, Radishes, Vegetable marrows (Eelworm attack serious).
Chapelton (Irrigated)	3½ acres	600 feet.	Medium light alluvium some admixture clay: Eggplants, Sweet peppers, Potatoes, Canadian and English tomatoes, Beans, Vegetable marrows (Eelworm attack serious.)
Retirement, St. Ann	1 acre between citrus trees.	1,200 feet	Red soil—Potatoes.
Borobridge	1½ acres	2,500 feet	Dark rich alluvium:— Potatoes, Eggplants, Sweet peppers, Tomatoes.
Grove Place Manchester	1½ acres	2,500 feet	Typical Manchester soil with mulch:— Eggplants, Peppers, Potatoes, English tomatoes, This plot was maintained throughout by Mr. Thelwell.
Low Temperature Station	¾ acre	Sea level	Made up land with overhead irrigation— a wide variety of crops including Asparagus and Carrots.

Plots of Collaborating Planters.

Place.	Area.	Elevation.	Soil Condition and Crops.
Prospect, St. Thomas, Sir C. Harrison and Mr. R. T. Harrison	¾ acre under coconuts	100 feet	Medium loam—Eggplants and Peppers.
Llandewey, Mr. R. Burke (irrigated)	¾ acre	300 feet	River alluvium:—Eggplants, Peppers, Canadian tomatoes.
Borobridge and Christiana, Mr. H. Heron	4 acres	2,000 to 3,000 feet	Various soils—Potatoes, Eggplants, Peppers, Tomatoes.

44. The scheme of experiment was as follows:—

Eggplants:—Comparative varietal tests of the following varieties—Florida Highbush, Fort Myers Market, Kilgore's Special, Black Beauty, Manatee Special, New York Spineless and French Long Purple. Manurial tests in a general way, especially in regard to top-dressing to overcome effects of Eelworm attack. Latterly tests were begun on budding eggplants on the Susumber plant in a commercial way—a practice which had hitherto been restricted to garden cultivation.

Sweet Peppers:—Comparative varietial tests of the three varieties, Improved Colossal, California Wonder and Florida Giant. The effects of top-dressing at various stages and the quality of crop at different elevations.

Irish Potatoes:—Tests of the following varieties at different elevations for the production of "scraper" potatoes for the English market during the Winter, and young potatoes for Canada in the Spring:—Epicure, Red Bliss, Katadin, Cobblers, Green Mountain, Royal Kidney, King Edward, Arran Banner.

Beans:—General varietal tests at different elevations to determine the possibilities of obtaining suitable produce for export to Canada and England. The following list of varieties was used:—

American Varieties:—	Long Round Green Pod
	Golden Wax
	Bountiful (2 strains)
	French Horticultural
	Bush Lima
	Cuban Asparagus
	Yard Long
	Pole Lima
	Old Homestead
	McCasland
English and French Varieties:	Early Parisian
	Metis
	Wonder
	Premier
	Masterpiece.

Cucurbitaceous Crops:—Experiments in a small way have been started with various cucurbitaceous crops to ascertain the possibilities of growing them for export. These include Gherkins, English Cucumbers, (Butchers' and Covent Garden Favourite), English Vegetable Marrows, East Indian Vegetable Marrows and three varieties of American Squash. Cantaloupes are also under trial.

Tomatoes:—Varietal tests and spraying experiments for disease control have been started with the following varieties:—

English type:—	Kondine Red
	Potentate
	Riverside
	Sunrise
	Ailsa Caig
American:	Marglobe, with small plots of other types.

Other Vegetables:—The following vegetables have also been included in small tests with the view of experimenting with them for export—Carrots, Radishes, (three varieties), Lettuce, Turnips, Cauliflowers (Indian type),and Cabbage, and Barbadian and American varieties of Sweet Patatoes.

45. This rather large programme has been attended to mainly by Mr. Miller, with assistance from various other members of the staff from time to time. Mr. Thelwell has taken complete charge of the Grove Place plots and Mr. Baxter of the Jamaica Agricultural Society has given assistance from time to time through his staff, and gave great personal assistance in the 1934-35 experiments when the crop was grown on land leased from him. Mr. Heron, Major Moxsy, Mr. H. Braham, and others from whom land has been leased, have also given great assistance in many ways.

46. *Overhead Irrigation:*With the installation of the well to provide a water supply for the Low Temperature Station, opportunity was taken to install samples of various systems of overhead irrigation on a small scale. Preliminary tests of various rotating nozzles and perforated pipe systems have been made and the experiments will be extended in 1936.

Marketing.

47. Prior to the completion of the Low Temperature Station and the Packing-house, the produce from the plots of Eggplants and Peppers at Waltham Park were packed for export in a shed at Waltham Park which had a few structural alterations made to make it suitable for the purpose. So much interest, however, was taken in the experiment and sufficient growers indicated their desire to participate in the experimental work that it was decided that the Low Temperature Station should act as a Government Marketing Agency for *bona fide* growers of vegetables. A revolving advance of £400 was authorised for the purpose of maintaining an adquate stock of box-shooks and packing material and to finance freight and other marketing expenses. Interest, both abroad and in Jamaica, developed so rapidly that this phase of the Low Temperature Station's activities was extended to cover any new crop which might show possibilities as an exportable product. Arrangements were made with the Jamaica Agricultural Society that it would reimburse the Low Temperature Station for payments for packing and shipping, and the Society would in turn reimburse itself from the account sales for the produce, before distributing the returns to the growers themselves. This system has worked quite satisfactorily.

48. The Advance Account has proved of great benefit and in making special experimental shipments profits have frequently been made which have offset losses sustained on shipments of other new commodities which have not proved to be satisfactory in one way or another. As a result, a very much wider field of work has been possible in the short period since the Station was opened than could possibly have been undertaken under the ordinary system of finance.

49. *Eggplants* (*Aubergines*):—This commodity has been shipped in small quantity to Canada with some measures of success in the past but it was only in 1935 that serious attempts were made to ship the fruit to England. The London market it amply supplied with the fruit at a cheap rate from Mediterranean sources during the Summer and Autumn, but prior to Jamaica entering the field, the supply was completely absent in the Winter and Spring months. After studying the various methods of packing the Mediterranean products, which, of course, have a very much shorter journey to the market, specially constructed hinged-

corner crates were ordered, made of thin slatted pine with spaces for ventilation between the slats, with side-cleats allowing for ample air spaces between the crates when closely stowed on board ship. These small crates were supplied to order in shook form from London, and having the patent hinged corner, proved to be very strong and easily assembled. The outside measurements are 18″x12″x9″, equivalent to 1-1⅛ cubic feet for freight purposes. These crates proved satisfactory for the smaller sizes and were packed as 8s., 10s., 12s., 14s., 16s., 18s., 24s., 30s., 36s. and 42s. The larger fruit, however, was packed in the standard American Pepper crates with panel ends and slatted sides with outside dimensions of 24″x16″x11½″. The crates were lined with white glazed tissue and the fruit wrapped in similar paper, an adequte amount of woodwool being used to prevent shaking and bruising. The early crop carried very satisfactorily at a temperatuee of 42°-45° F. but the later supplies were reported as showing some waste. After the Departmental plots had ceased to bear fruit, Mr. Baxter in a public-spirited manner continued to make shipments during the Summer and Autumn months, which although they supplied valuable information, resulted in considerable loss to this gentleman.

50. It is noteworthy that while the English market is invariably supplied with the long varieties during the Summer, no difficulty was found in selling the rounder American type during the Winter. Between January 29th and May 29th, 1935, the shipments from the Departmental plots at Waltham Park consisted of a total of 329 small crates and 83 large crates, yielding an average nett return after allowing for all shipping and marketing expenses of 9/1 per small crate and 15/9 per large crate. Shipments made from July to October showed losses in practically every case and a recovery to profitable prices only took place towards the end of November.

51. *Sweet Peppers* (*Capsicums*):—This vegetable had also been shipped in small quantities to Canada in the past, but again we were breaking new ground in entering the English market. As in the case of eggplants, heavy supplies of Capsicums enter London during the Summer and Autumn from European and Mediterranean sources, but none have previously been available during the Winter. The first shipments were made partly in the standard American pepper crate and partly in small slatted crates similar to the small Eggplant crates. The crates were lined with pink glazed tissue and the fruits wrapped in similar paper, a small amount of woodwool being used at the top and bottom of the crate. The small crates proved to be more acceptable than the larger ones and we have finally standardized the hinged-corner slatted crate 16″ x 11½″ x 9″ which measures for freight purposes 1 cubic foot. Latterly the wrapping of the fruit has been dispensed with as the market appears to prefer the unwrapped product and no deterioration appears to take place as a result of shipping the fruit unwrapped.

52. No wastage has ever been reported in the English shipments of this commodity although both green and fully coloured peppers are shipped regularly in the same crates. The mixture of green and coloured fruits appears to be attractive to the trade and the demand for the product seems to have been established and is likely to increase.

53. Profitable returns were received up to July but shipments made from late July until mid-November resulted in losses. The small Departmental plot yielded a total of 104 crates between February 12th and May 21st, which gave a gross return of £64 10s. 4d. or an average nett return, after paying all expenses, of about 7/6 per crate.

54. Plans have been made to ship both Eggplants and Peppers to Canada during the 1935-36 season and the first consignments left just before the end of the year.

55. *Mangoes:*—Moderately small experimental shipments of the free-stone Pairi mango, which is grown in considerable quantity on the Hope Stock Farm, were made in 1933 and 1934 with satisfactory results but with some degree of wastage. In 1935, with the opening of the Low Temperature Station, shipments of greater size were made, many different types of crate and packing being used. The results of the numerous experiments conducted in association with the commercial shipments are given elsewhere in this report, and the commercial aspect only will be dealt with at this stage. After trying numerous types of crates we finally standardised on a single-layer tray with stout pine ends and sides and with a slatted top. This was made in two depths according to the size of the mango being shipped. The large fruit which packed either 12s. or 15s. was placed in the deeper crate while the shallow crate was used for the 20s. and 24s. The external dimensions in the two cases were 17½ x 11½ x 5½ and 17½ x 11½ x 4½ respectively. The crates were lined with tissue paper and the fruit wrapped in various types of paper to find the most suitable variety. Ample woodwool was used to prevent movement as the fruit is liable to damage from the slightest pressure. As far as possible, weekly shipments were maintained from May until mid-July, but to do this some consignments had to be placed in banana space at 52° F. This temperature proved too high for satisfactory results and the amount of overripe fruit in such shipments had a serious effect upon the account sales. The shipments made at lower temperatures were much more satisfactory but even in these some considerable amount of wastage took place, and it was only after numerous experiments that indications were obtained as to the means of overcoming this loss. It is hoped that the application of the results of the 1935 experiments will yield better general outturn of shipments in 1936.

56. In spite of this wastage, however, the fruit which arrived in a sound condition proved most attractive and sold at prices as high as 12/- per dozen wholesale. The 1935 mangoes, however, were somewhat larger than the average, and with heavier shipments in future, it is likely that prices will fall to some extent.

57. A few shipments were also made to the Canadian market and while these proved to be most unprofitable, all hope of developing trade in this commodity with the Dominion has not been abandoned.

Record of Shipments.

England.		Net Return after paying all expenses and including wastage.
May 21st ..	1,200 fruit	4/11 per dozen
May 29th	1,214 "	3/11 "
June 4th* ..	598 "	10d. per dozen
June 11th	1,170 "	3/8 per dozen
June 18th* ..	616 "	1/2 per dozen
June 25th	1,088 "	4/1½ per dozen
July 2nd ..	1,050 "	4/- per dozen
July 9th* ..	564 "	1/6 per dozen
July 16th ..	1,336 "	4/2 per dozen
Canada.		
June 12th	645 "	2¾d. per dozen
June 25th ..	720 "	*loss* of 2½d. per dozen
July 2nd*	450 "	*loss* of 1/10 per dozen
July 9th ..	600 "	6d. per dozen.

*Shipped in bmana holds at 52° F.

58. The success of the English shipments as compared with the Canadian is largely due to the number of English people who already know mangoes as compared with the Canadians, and to the abundance of high quality fruit of other kinds at a cheap price in the Montreal markets. The free-stone quality of the Jamaica Pairi mango has been quickly recognised in England and for this reason the Jamaica consignments have invariably sold for higher prices than competing shipments from elsewhere. It is, therefore, clear that future shipments should be restricted to this variety only.

59. *Avocado Pears:*—In response to requirements of numerous planters experimental shipments of Avocado pears were begun in the first week of September and were continued until the end of October. At the outset it was recognised, in the light of Wardlaw's experimental work at Trinidad, that the average run of West Indian seedling varieties would be unsuitable for export and this fact was proved conclusively by the financial losses involved. The first shipment contained a number of fruit from budded trees obtained from Florida and this was the only consignment which proved profitable. Subsequent shipments were made from special trees whose fruit appeared to be of the correct type and special reports were made in London on each type. They were complete failures however and it was finally decided to abandon any further shipments until such time as more definite information had been obtained by cold storage trials. It should be mentioned that with each of the shipments, parallel lots were packed and kept in the Low Temperature Station for a corresponding period to that taken on the voyage to England. In this way it was possible to gain a very good idea of the condition of the fruit on its arrival overseas. Cold Storage experiments were continued for some time after the shipments had ceased and a fairly clear idea was finally obtained as to the type of West Indian seedling which would possibly materialize into an export fruit. This question is discussed in another section of the Report but for the time being it has been decided that further exports should be restricted to the established Florida shipping varieties and to that end arrangements have been made through Dr. Fairchild and Dr. Popenoe to obtained budwood and plants of such varieties for the purpose of establishing groves of these sorts.

60. *Limes:*—Previous experiences of lime marketing in England have been mainly unsatisfactory and it was not until advices were received from London in August that some demand for limes had been created on account of the shortage of Mediterranean Lemons that the export of limes to that market was given any serious consideration. Small shipments were made however, and as these proved profitable it was decided to maintain small regular supplies in the hope of ultimately creating a permanent demand. It was clear that with the institution of sanctions, Italian lemons would not be available and it might be possible to induce the British public to use limes instead of lemons. Losses were sustained on many of the shipments but it is interesting to note that the propaganda work instituted at the Jamaican Exhibit at the British Industries Fair in February, 1936 has aroused interest in this commodity and it is confidently expected that an advertising sheme which is proposed for the summer of 1936 may result in some headway being made in the establishing of a permanent demand for this commodity.

61. It is possible that it is a mistaken idea to induce the consumption of limes only as a substitute for lemons and it is likely that by suitable advertising and propaganda work the lime will command a market of its own quite independent of the lemon. This undoubtedly should be the objective in any market development work.

62. *Miscellaneous Fruits:—Soursops* and very large *Granadillas* were shipped in small quantities to London but proved to be complete failures. The former because of its unsuitability to cold storage of any kind and the latter because of its size and thick rind. It is satisfactory to note however that shipments of other fruits of the Passiflora group made after the period covered by this Report have not only travelled without deterioration but have also returned very remunerative prices and steps are being taken to extend the cultivation and variety of these fruits so that a longer shipping season may be obtained.

63. *Kumquats* were asked for by our London consignees during the autumn and small shipments were made, limited by the very small quantity of the fruit now available in Jamaica. They were packed in the American 6-basket crates, the baskets each holding 4 quarts. The demand was good and 1/- per lb. was realized on all the fruit shipped. It is noteworthy that this type of package is very suitable for special high priced products and although expensive from the point of view of freight, the improved financial returns obtained considerably offset the extra expenses involved by the use of this class of package. It has een well spoken of in Covent Garden trade papers.

64. It is unfortunate that there is little prospect of expanding the trade with Kumquats as only a few trees now exist in Jamaica. It is of course a commodity which is unlikely ever to have a very large market but a moderate amount of planting appears to be fully justified.

65. *Chochos* (Chayotes):—Small quantities of this prolific vegetable were sent both to England and Canada. The demand is small apparently in both markets and a good deal of propaganda work will be necessary before any appreciable trade can be built up. The green variety obviously retains its fresh appearance much more satisfactorily than the white and more attention will be given to this crop later.

66. *Miscellaneous Vegetables:*—The crops from the vegetable experimental plots mentioned in the previous section of this Report were beginning to mature in December and before the year closed shipments had been made of the following commodities:—new potatoes, vegetable marrows, beans and radishes as well as eggplants and capsicums. Strictly speaking these shipments come into the 1936 programme and will in consequence be reported upon in a subsequent publication.

67. Such a report however may be partially anticipated at this point by mentioning that suitable varieties of beans for export were obtained by a process of elimination from the long list of varieties subjected to trial and a satisfactory method of packing and refrigeration was ultimately established. As remunerative prices were received and the immediate outlet for such a product is considerable, there is every hope of establishing exports in some volume. The same remarks apply to the experiments with new potatoes. In this case however, it is very striking that only certain varieties of potatoes will be purchased by the English consumer at prices profitable to the grower. The best markets for the commodity are between December and February and some ingenuity has had to be brought into play to ensure supplies of seed of the correct varieties for planting in early September so that the crop may reach the market in time for Christmas.

68. *Citrus Fruit:*—While oranges and grapefruit are not considered to be within the province of the marketing activities of the Low Temperature Station, apart from experimental work on fruit wastage, yet under the general policy of market exploration, small shipments of Tangelos and other special varieties of citrus fruit were begun in November and several other consignments have been made with satisfactory results subsequently.

69. *Shipments to Curacao:*—With a view to widening the outlet for Jamaica produce investigations were made in Curacao, Dutch West Indies, as to the possibilities of shipping citrus fruit and vegetables to that Island which has no agricultural industry of its own. With the hearty co-operation of Messrs. John Henderson and Co. of Emmastad, a small but satisfactory trade has been established in spite of the difficulty of rather infrequent communication and high freight rates and it is hoped that in course of time that a regular trade will be established with that Island.

70. *Canned Mangoes:*—In view of the satisfactory demand for the Jamaican Pairi Mango in the fresh form it was decided to experiment with canning this commodity. Mr. H. Braham of the Jamaica Citrus Producers' Association kindly consented to carry out the work on behalf of the Low Temperature Station in his own canning plant. The fruit was peeled and halved in a manner similar to that used for canned peaches and it was put up in heavy syrup in No. 2 tall cans. Utilizing fruit at various stage of ripeness, it was established that fully ripe fruit became rather soft and the "halves" lost their shape to some extent. Fruit which was just starting to ripen however, remained firm and the canned product had a good appearance and texture.

71. Sample consignments were sent to the canned goods department of Messrs. T. J. Poupart Ltd., of London, who distributed them to the buyers of several important London stores. Individual reports were received from these sources and these may be summarised to the effect that the mango halves in heavy syrup, provided they are canned at the correct stage so that firmness of the flesh is maintained, are quite suitable and have a good flavour. The demand for such a product however is very limited as they would appeal mainly to those who had lived in tropics. A certain outlet might be found in the better class restaurants and hotels but no large demand would be found without suitable advertising.

72. In addition to the halved fruits, successful attempts were made to can mango pulp such as might be utilized for making ice-cream and other dessert dishes. The Pairi mango was blended with other types for this purpose but in every case the reports were very discouraging although the pulp retained its flavour and colour quite satisfactorily.

73. Further canning experiments are under consideration for 1936.

74. During the year 1935, in spite of the preliminary nature of the work, the Low Temperature Station shipped a total of 3,511 packages and 416 stems of bananas, covering 39 shipments to England, 9 to Canada and one to Curacao. It is interesting to note that this total has been exceeded in the first four months of 1936.

Low Temperature Investigations.

75. In dealing with this phase of the Station's activities it is perhaps desirable to reiterate the general scheme of work for which the experimental Cold Store was provided. While it was and still is recognised that the Low Temperature Station attached to the Imperial College at Trinidad is dealing with the detailed fundamental work connected with the refrigeration of tropical fruits generally, and the new varieties of bananas in particular, there are, however, many practical features of refrigeration of such products which are peculiar to Jamaica and can only be worked out on the spot. The general plan of work in Jamaica is, therefore, intended to be complementary to that in Trinidad; and while it is understood that the latter will deal mainly with basic problems, the Jamaica Station will deal more with the application of the Trinidad results in a practical and commerical way, in so far as they affect Jamaica's own problems. At the same time those problems which are peculiar to Jamaica and its particular crops, such as the testing of the transporting qualities of the Jamaican seedling bananas, wastage in oranges and grapefruit, and urgent problems connected with new crops, will be dealt with on the spot, and what is probably most important, in parallel with commercial shipments where all those factors connected with actual transportation and marketing are brought to bear on the results. In other words, it is hoped that the Jamaica station may ultimately become, to some degree at any rate, the avenue by which the valuable scientific results obtained in Trinidad may find their way into practical commercial application. In this connection the Jamaica station is singularly fortunate in having the hearty co-operation of the Jamaica Banana Producers' Association whose very modern refrigerated steamers are always available for experimental shipments. It is only through the hearty co-operation of the officers of this company, both ashore and afloat, coupled with the extraordinary interest of Messrs. Ravenhill, Cook and Burns of T. J. Poupart Ltd. that the experimental work of the new station can be carried to the final point in practical application.

76. *Bananas:*—Allthough the formal opening of the Low Temperature Station by His Excellency the Governor, Sir Edward Denham, took place on May 23rd, certain of the apparatus, such as thermostats, had still not been received. This delay prevented the best of the banana crop from the experimental plots being used for refrigeration tests, and unfortunately the two hurricanes in the Autumn destroyed trees which would have yielded material for experiments during the Winter.

77. Banana tests from start to finish occupy a period of from 4 to 5 weeks. This includes 15 to 16 days of refrigeration and the remainder of the time in ripening the fruit and precooling for the next experiment. The general procedure was as follows:—the rooms were precooled to a temperature of approximately 47° to 48° F. prior to loading the bananas; the fruit was brought into the station and carefully weighed and tagged so that each bunch could be identified afterwards; as loading began the fans were shut off and the fruit stowed in the room in the usual "banana-ship" manner, either "three high" or" two high and one flat," until the room was full to the doorway; the rooms were then "put on atmosphere," i.e. blown out with fresh air for one hour when refrigeration really began. Temperatures were brought down steadily to 53° F. over a period of three days: a feat which took some manipulation, on account of the very ample refrigerating power of the machinery which is quite capable of bringing the temperature down to the required level in just a few hours; throughout refrigeration the air in the rooms was completely replaced by fresh air three times daily, by putting the fans "on atmosphere" for 15 to 20 minutes, morning, afternoon and night. When refrigeration was completed, the fans were stopped and the fruit removed to the airlocks where it was weighed and careful notes made of stem-end rot and other points.

78. Ripening was carried out in the same chambers in a manner as near as possible resembling that used in commerce. Removable beams with hooks attached were made so that the bunches could be hung alternately high and low in the usual fashion. It was found that one roomful of bananas under refrigeration would spread into three rooms for ripening, so that banana experiments very largely precluded any other concurrent Cold Storage experiments unless the latter were very carefully timed to fit in with the banana experiments. On the whole, the ripening temperatures were fairly readily controlled in the Cold Storage chambers although great care was used to avoid undue amounts of draught striking the fruit which might interfere with satisfactory colouration of the fingers on final ripening. Each day the ripe fruit was removed, weighed again, and then after the usual observations had been recorded, the bunch was cut up into hands and valued as No. 1's, No. 2's, loose and rejects, the number of fingers of each kind being recorded.

79. This rather elaborate system of recording made it possible to set at least a rough commercial valuation on each type of fruit and to ascertain the number of dozen fingers per ton which might be normally expected from any particular type of fruit when cut at various degrees of maturity.

80. *Cavendish Bananas:*—The earlier experiments were concerned mainly with the Cavendish banana. In accordance with the Departmental plan to give this variety to a thorough test in Jamaica, plots had been established in the previous year in a variety of locations, in addition Mr. Bovell of Caymanas and Mr. Ffrench-Mullen of the Banana Company of Jamaica had also established small plots and through the kindness of these two gentlemen additional sources of supply were available without cost to the Department beyond the expense of transportation. The Banana Producers' Association also gave assistance in transportation of fruit in their railway cars.

81. The sources of supply of Cavendish fruit are given below and it will be noted that they cover a wide range of climatic and soil factors:—

Plot.	Parish.	Soil.	Altitude.	Remarks.
Departmental—				
Hope	St. Andrew	Gravelly alluvium.	600 ft.	Dry climate, some irrigation.
Glengoffe	Do.	Medium clay loam	750 ft.	Moderate rainfall.
Coleraine	St. Mary	Medium rich alluvial loam	Sea level	Excellent situation for banana growing.
Nonsuch	Do.	Heavy St. Mary banana clay land	500 ft.	Slightly exposed but excellent banana land for Gros Michel.
Borobridge	St. Ann	Dark alluvial loam	2,500 ft.	High elevation, good rainfall.
Latium	St. James	Medium heavy soil	300 ft.	This plot was a complete failure.
Mr. Bovell, Caymanas	St. Catherine	St. Catherine plain soil, limestone origin	30 ft.	Irrigated.
Mr. Ffrench, Mullen, Rosend.	St. Mary	Heavy alluvium derived from St. Mary hills	100 ft.	Excellent banana land.

82. The tests covered normally between 200 and 300 stems of fruit drawn from these various localities and great care was taken to see that each class of fruit was evenly distributed throughout the room. Three sets of experiments were completed prior to the loss of the bulk of the fruit from hurricane, and subsequently two empirical tests were carried through on smaller quantities to test whether the Jamaican Cavendish banana could withstand lower temperatures and very dry air during refrigeration.

Test No. 1 (June, 1935):—235 stems of Cavendish fruit from five different localities—fruit partially American and partially Engiish grade.

Refrigerated 14 days at 53° F. Relative humidity in the room averaged 94% and never dropped below 90%. Temperature and humidity were adjusted by manual control as the automatic humidity control had not yet been installed. Temperature variation after original reduction to desired point less than 1° F.

Result Test 1.— Cavendish.

Origin.	Grade.	Average stem end Rot in inches.				Days to Ripen Average.	Percentage loss in weight during Cold Storage	Grading of Fingers.				Average in Fingers.				Value per ton*.	Fingers. per ton.	Counts per ton.
		Before Ripening		After Ripening				No. 1.	No. 2.	Loose.	Rejects.	9s.	8s.	7s.	6s.			
		Top.	Bottom.	Top.	Bottom.													
Glengoffe ..	F	0.1	3.3	6.4	10.2	7.8	3.7%	20½%	52½%	17%	10%	149	132	121	..	£13 18 4	6,822	34.4
	½	0.3	3.7	7.9	10.1	8.8	3.2%	13.3%	64.1%	15.5%	6.6%					16 11 2	7,929	47.2
Coleraine ..	F	0.3	2.7	4.6	6.8	5	2.9%	40.5%	41.3%	12.7%	5.5%	136	125	117	..	13 11 0	5,742	34.3
	½	0.5	1.9	6.5	9.5	7.1	3.3%	39.4%	42.1%	17.4%	1.1%	..				16 1 2	6,754	only 3 bunches
Nonsuch ..	F	1.3	5.5	6.3	12.3	5.7	2.5%	19.3%	53.3%	19.3%	8.4%	..	125	116	104	12 7 7	6,068	33.3
	½	1.2	5.1	5.9	12.2	6.5	3.0%	10.5%	65.8%	19.4%	4.3%					16 0 4	7,745	30.1
Hope ..	F	0.4	3.7	6.0	7.7	4.5	3.1%	55.6%	39.0%	14.2%	2.9%	175	135	121	..	17 9 7	4,475	23.1
	½	0.2	1.7	6.4	8.1	9.0	2.9%	40.1%	41.2%	11.7%	6.8%					17 6 7	7,433	40.9
Caymanas ..	F	0.7	2.7	6.6	9.0	6.4	2.8%	26.8%	52.7%	15.5%	4.9%	159	132	115	104	13 11 0	6,081	32.2
	½	0.6	2.8	8.0	9.8	7.9	3.3%	17.3%	62.6%	16.7%	3.4%					15 7 8	7,076	38.3

Note:—The valuation per tons was based on the current quoted prices for Brazilian bananas, namely:

No. 1s 7/6 per 10 dozen.
No. 2s 5/9 per 10 dozen.
Loose 4/- per 20 dozen.

From this figure the usual trade profits were deducted

It should be noted that the valuation figure is an arbitrary one but it does give a good index to the comparative values which in many cases are well below what would yield a profitable return to the grower. It is noteworthy also that the Nonsuch fruit although the most fresh when placed in the cold store, showed the greatest amount of stem end rot and the smallest bunches, a striking feature in view of the fact that the same land prior to Panama Disease infection yielded very fine and heavy bunches of Gros Michel.

The most important result of this experiment cannot be shown in tabular form and this refers to the general appearance of the fruit of different origin after it had been ripened. Apart from the differences in the quantity of stem end rot and general shape of the bunches from each locality was in every instance most typical and each source of supply produced fruit of an entirely different colour and flavour, so much so, that in some cases it might also have appeared that quite different varieties were involved.

The planting material for all these plots came from the same source so that it is quite evident that the differences in the quality of the fruit grown under this variety of conditions is of physiological origin and not due to genetic variation in the plants themselves.

In two subsequent experiments carried out on the same lines but in which fruit from two other sources were included, these differences in appearance were maintained and the fruit from the high elevation plot at Borobridge stood out very clearly from the others with its brilliant yellow colour.

Other tests were carried out with bananas and while the full details are not given here they are being prepared for publication as a separate bulletin. A summary of the results will therefore be given at this stage.

Test 2.—*Cavendish Bananas* (June-July).—Similar in most respects to Test 1. Fruit from the same places with Borobridge added. A few bunches of Gros Michel, Seedlings and Highgate bananas were also included. The same environmental effects in relation to the appearance of the ripened fruit were evident, confirming the results of Test 1 in this respect: 291 stems of fruit were used and loaded into two chambers. The fruit was divided so that a portion was cold stored one day after reaping and the remainder two days after reaping. Half of each lot was allowed to remain in the same condition as reaped while the other half had the ends of the stems freshly trimmed immediately before cold storing. The final differences between the one day and two day old fruit were not significant, but the trimming of the ends of the bunches immediately prior to shipment showed a decided improvement in so far as stem rot was concerned at the end of the cold storage period.

As a supplement to the main experiment a number of bunches were selected for testing the value of freshly trimming the ends before cold storing and treating the fresh cuts with vaseline. There was a significant improvement in the stem rot condition in the freshly trimmed stems as compared with the untrimmed fruit but no really significant difference between those merely trimmed and those trimmed and vaselined.

Test 2a. *Effect of huimidity upon "chilling".*—As it has often been stated that dry air even at suitable temperatures will produce the so-called "chilled" appearance, a portion of the fruit in this test was cold stored at an average relative humidity of 75% instead of the more usual high relative humidity of 95%. The temperatures were carefully maintained at 53 degrees F. and at the end of the 14 days cold storage the fruit so treated had a dull appearance with difinite signs of the brownish coloration associated with the condition known as "chilling". It is true that the condition was not intense but nevertheless it was universal in the fruit under test. On ripening the "chilling" effect was even more definite.

This empirical test with Cavendish bananas with dry air shows that humidity is connected with "chilling" to some extent, and further experiments on this point are planned, not only with Cavendish, but also with Gros Michel.

Test 3. *Cavendish Bananas* (August)—This consisted of 107 stems of Cavendish from four sources and was a repetition of the former experiment. The very striking variations between the fruit from the different localities was again apparent, but the valuations of the fruit after ripening showed some considerable improvement.

Test 4. *Cavendish Bananas chilling test.*—This was an empirical temperature test in which, after normal cold storage for three days at between 90 and 95% relative humidity, the temperature slowly reduced to 48 degrees F. and maintained at that temperature for a week. At the end of this period the fruit had developed a strong tinge of khaki colour, typical of the condition known as "chill," and when ripened the flavour and general appearance was very indifferent and unattractive.

It is noteworthy that the "chilling" by temperature produced more intense effects than the "chilling" with dry air. In the latter case, the effect upon the flavour of the fruit was less apparent. In Test 4, the fruit obtained from the high elevation plot at Borobridge showed greater damage than those fruit from the lower elevations.

It is apparent therefore that the Cavendish banana is definitely sensitive to temperature slightly below 52 degrees F.

Closer temperature and humidity tests in regard to "chilling" effects will be carried out when supplies of fruit become available again.

Highgate Bananas.

From time to time as supplies were available, a few stems of the Highgate banana were incorporated in these tests and shipments. The full fruit used in the cold store tests, showed an average of 388 dozen fingers to the ton as compared with 643 dozen in the three-quarter grade fruit. Additional tests on this variety are contemplated when supplies of fruit are forthcoming.

Seedling Bananas.

S. 19.

Tests of this variety made at the same time as the Cavendish Test 2, proved that, with care, the seedling fruit ripened to a good colour and flavour, but on full ripeness being reached, the tendency for the fingers to fall from the hand due to the weakness of the fibre in the stem became apparent. This weakness was equally apparent both in full and three-quarter grade fruit.

Twenty-four stems of fruit were used, with the following results:—

Grade.	Average stem-end rot at base. Before ripening	After ripening.	% Grading of fingers. No. 1	No. 2	Loose.	Rejects.
Full ..	4.5 in.	11.9 in.	33.2	34.7	19.6	11.9
Three-quarter	2.8 in.	6.0 in.	29.5	35.8	21.9	13.8

Grade.	Loss in weight.	Number of fingers. 9s.	8s.	7s.	6s.	Dozen fingers to ton.	Counts per tons.
Full	6.9%	162	140	104	—	533	35.3
Three quarter	8.1%	176	133	132	80	691	42.1

Other Seedling Bananas.

Due to the necessity of giving precedence to the requirements of plant breeding, only a small number of bunches of other new hybrids were available for refrigeration tests. Odd bunches of S7, S20 and S95 were obtained and treated in the usual manner. It is, of course, undesirable to generalise on the behaviour of one or two bunches. S20 showed the same weakness as S19 in that the fingers began to fall from the hands as soon as they reached full ripeness, but the colour of the ripe fruit was inferior to that of S19. S7 was very short in the finger but ripened to an attractive colour and the fingers held to the stem quite well. This variety, however, has consistently shown the undesirable characteristic of having short fingers and for this reason is never likely to be of any commercial value. Only one very small bunch of S95 was tested. The colour was poor although the flavour was not unattractive.

Shipping Tests of Bananas.

As a parallel to the tests in the Cold Store several shipments of the same varieties were sent to England where records were taken by Mr. Cook of T. J. Poupart Ltd. and Mr. G. A. Hawkins, a member of the Advisory Committee, who happened to be in England at the time.

April 2nd, 1935: (ss "Jamaica Producer.")

39 stems Cavendish (origin Coleraine, St. Mary and Hope).
5 stems Seedling S 19.
5 stems Seedling S20.

The Cavendish fruit was all packed in double thickness brown paper bags perforated with one-inch holes about every six inches. Pads of banana trash were inserted beneath the lower hands, a method used in shipping this variety from Brazil. The seedlings were shipped unwrapped. All this fruit was stowed in a bin mixed with Gros Michel in the usual manner so that it should be subjected to the treatment normal in commercial shipments of fruit.

The London report may be summarised as follows:—

Cavendish:—Many bunches badly bruised and squashed but the better stems ripened well and compared very favourably with similar fruit from other sources. When held in the ripening room at 57 degrees F., stem rot caused little damage and the fingers held to the stem very well.

Seedlings:—Ripened to a good colour and flavour but dropped their fingers when fully ripe.

April 16th, 1935: (ss. "Jamaica Pioneer.")

Cavendish bananas only—71 stems (54 from Nonsuch, 19 from Rosend, St. Mary).

48 stems of fruit were shipped in bags and 23 stems were shipped unwrapped. As before, these were stowed in a bin mixed with Gros Michel. On arrival in England the shipment was divided into two parts, 52 stems being sent to London and the remainder to the North of England. It is unfortunate that no detailed report was received concerning the latter, but in the case of the former it was reported that they arrived in far better condition than the previous shipment, stem rot being apparent in four bunches only. Fruit shipped in bags was much less bruised than that shipped in the usual manner. The market at the time this fruit arrived was in a weak condition and although the ripe fruit sold readily, the net return was so low that it would not prove profitable to ship fruit under these circumstances.

May 7th, 1935: (ss. "Jamaica Producer".)

72 stems Cavendish (St. Mary, Coleraine, and Nonsuch).
28 stems Seedlings.
30 stems Highgate.

The Cavendish fruit was divided into two lots, 50 stems being shipped unwrapped while 22 stems were placed in paper bags as before, and then further wrapped in rush mats similar to those recently being used in Brazil. The consignment was stowed in the ship in the manner normal for Gros Michel.

The London report on the Cavendish fruit stated that with the exception of a few stems which were slightly squashed during transit, the fruit shipped in rush covers arrived in excellent condition, free from stem rot and brusises, and ripened splendidly. Colour and flavour were perfect and the fruit was considered to be the best lot of Cavendish ever received. It was found, however, that the cost of the rush mats, coupled with the additional space taken up by these mats in stowing the fruit, made such a method of packing unprofitable under present circumstances.

The unwrapped fruit was considerably bruised and some bunches were unfit for sale but in general they were reported to be of better quality than fruit from other sources. Average 12 dozen fingers per stem, fruit grading 69½% counts.

Seedlings:—22 stems of S19 from the Coleraine plot in St. Mary shipped unwrapped but stowed normally. The London report indicated the usual weaknesses of this variety, several stems which were partially shipripe were badly squashed and the fingers all dropped quickly. Flavour and colour were good, but the fingers were rather small and consequently the bulk of the fruit was sold as No. 2. Average 12½ dozen fingers per stem grading 98% counts.

Highgate Bananas:—30 stems (all counts) from Hampstead, St. Mary.

This fruit was mostly rather full. The London report indicated that the more mature fruit ripened a little unevenly, while the three-quarter grade fruit was much better. In the full fruit the outer fingers appeared to be shorter and consequently had not such a good appearance when packed in boxes as "Gros Michel". The very full fruit was also damaged easily but this was not so apparent in the thinner grade. Average 13-7/12 dozen per bunch with 100% grade of counts.

16*th July*, 1935:—(ss. "Jamaica Producer.")

Cavendish: 109 stems (origins—Caymanas, Borobridge, Glengoffe and Nonsuch, St. Mary).

Highgate Bananas: 29 stems (origin Hampstead and Highgate, St. Mary).

All shipped unwrapped but having the stems freshly trimmed before shipment. Stowed in bin mixed with Gros Michel.

The London report upon the Cavendish bananas, made by Mr. Cook and Mr. Hawkins, showed that the general run of fruit was definitely inferior to that in the previous shipments. Bruising was conspicuous and the bunches generally smaller. This fruit yielded an average of 7-7/12 dozen marketable fingers per stem with a grading of 64½% counts.

Shipping weights were as follows:—

9-hands average 51⅛ lbs.
8-hands average 42¼ lbs.
7-hands average 33 lbs.
6-hands average 32½ lbs.

Highgate Bananas:—These were of a thinner grade than the previous consignment and were quite well reported upon, the fingers being of a more suitable size and firmness. They ripened very satisfactorily and showed marked superiority over the Cavendish and equal to the Gros Michel. Wastage was small and mainly due to bruising during transit. The fruit yielded an average of 13½ dozen fingers to the stem with a grading of 99% counts. The wastage averaged 4½ lbs. per stem during the ripening processes. Shipping weight averaged 48⅛ lbs. per count. 634 dozen fingers per ton.

This shipment showed the advantage of shipping Highgate bananas at three-quarter grade in preference to fruit which is round full.

20*th August*, 1935: (ss. "Jamaica Producer").

93 stems Cavendish.
13 stems Seedling S19.

All fruit shipped unwrapped and mixed with Gros Michel, normal stowage.

Cavendish:—These bunches were drawn from the Caymanas, Colraine, Glengoffe and Borobridge plots, and both full and three-quarter grade fruit was taken in every case. The London report was made by Mr. Hawkins who made records of each bunch in detail. The Coleraine fruit arrived in very poor condition and and in every case the full grade fruit was practically valueless. The fuller fruit not only ripened badly but showed much greater susceptibility to bruising. The fruit from the higher elevation (Borobridge) was the only part of the shipment which really proved satisfactory. It ripened well and the fingers held to the stem even when fully ripe, while the colour was superior to the others. No doubt the colder climate produced a tougher skin which was responsible for less bruising being apparent in the fruit from the Borobridge plot. It was also noticed that the irrigated fruit and that grown in St. Mary where heavy rains had been falling showed more bruising than in earlier shipments. The shipping weights and grades are given in the following table:—

Origin.	9s.	8s.	7s.	6s.	% Grade.	Average weight per count.
	lbs.	lbs.	lbs.	lbs.		lbs.
Glengoffe ..	51	37½	28¼	23½	65½	56¼
Borobridge ..	..	31¼	28¼	23¾	44	60½
Coleraine ..	49	42	36	40	74	57½
Caymanas ..	41	40¼	31½		68¾	53½
Average	48¾	41	30	25	62.9	57

Seedlings S19:—Many of these bunches were of round full grade and in consequence were turning colour on arrival in London. The fruit was bruised and ripened badly even in the case of the thinner fruit. The flesh of the ripened fruit was poor and all the bruised fingers dropped very readily. It is characteristic of this variety that even slightly bruised fruit is also inedible when ripe as the flesh becomes water-soaked. Average shipping weights:—

9-hands 53½ lbs.
8-hands 39½ lbs.
7-hands 39½ lbs.

Grading 80¾%. Average weight per count 59¼ lbs.

Summary of Refrigeration Tests and Shipping Trials with Cavendish Bananas, 1935.

Altogether, thirteen different tests were made of Cavendish bananas from the seven plots from which fruit was actually taken, these tests being divided between Cold Storage experiments and shipments abroad.

The following table shows the grading of the fruit cut at different periods:—

Summary of grading of Fruit from seven Plots, 1935.

Month.	Hope Irrigated.	Coleraine, St. Mary. Alluvium.	Nonsuch, St. Mary. Heavy clay.	Rosend, St. Mary.	Glengoffe St. Andrew	Caymanas, St. Catherine Plains Irrigated.	Borobridge High Elevation.
	%	%	%	%	%	%	%
February ..	61½						
April ..	..	75	75	75			
			70¾	70¾			
May ..	91½	69	69¼	69¼	69	70	
	75	73	47	..	85	..	..
June ..	52	56¾	75	..	65	64¼	69
July ..	75	..	59½		75	74	57½
August ..	75	74	..	..	65½	68¾	44
					68	77	43¾
September ..	87½	..	..	..	58¼	83	62

The outstanding points concerning these experiments may be summarised as follows:—

Fruit from different localities covering a range of climate, soil and elevation, showed marked difference in appearance and quality generally. Fruit from lower elevations was heavier and graded higher and had more shapely bunches. On the other hand, fruit from higher elevations was tougher in the skin and so more capable of withstanding, with a minimum of bruising, the treatment received during transport to foreign markets. The fruit from higher elevations was usually smaller in the finger but ripened to a better colour and flavour; nevertheless its low grading was a distinctly unfavourable characteristic.

Fruit shipped abroad, without any protection, was invariably badly bruised but such bruising was more conspicuous in the lower-level fruit and in the fuller grades. Normal three-quarter grade proved most satisfactory but, on the other hand, was too light in average weight per bunch to be profitable. Protection by means of double-thickness brown paper bags, suitably perforated, prevented a great deal of bruising, but such a system proved expensive and difficult to operate in the field, especially in wet weather, and was even more difficult to put into practice at the wharf without causing considerable delay. The use of additional protective covering, in the form of rush mats, prevented practically all bruising of the fruit, but this increased the cost and stowage space per stem and would be of very doubtful application on a commercial scale under present conditions.

The fruit from all plots, except the high elevation plot at Borobridge, fell off in quality very considerably after the month of May, and it was quite clear that in most places the early Spring months would be the only period when high class Cavendish fruit could be obtained in quantity. The Borobridge fruit, however, improved considerably towards the Autumn but was always of low grading.

Stem End Rot was always very common, both in the fruit shipped abroad and that held in Cold Storage in Jamaica. In the case of the full grade fruit, cushion rots of various sorts induced dropping of the fingers on ripening; and it is quite clear that should any export trade ever be developed, three-quarter grade fruit would have to be shipped.

Prices received for fruit sold in London compared very favourably with Brazilian bananas but were usually too low to be profitable to the grower.

The general result of these experiments shows that high and expensive cultivation would be necessary to obtain good yields, and some protective covering would also be necessary during shipment to prevent bruising. Judging from prices received, however, it is clear that the variations obtained in fruit from different districts, coupled with the additional expense of shipping as compared with Gros Michel, would not make the Cavendish banana a profitable proposition to the average grower at present. Consequently, this variety of banana can only be looked upon as the very last line of defence in regard to the Jamaica banana business, unless opportunities occur to utilise it for bye-products manufactured within the Colony, in which case it might well prove quite profitable as it could then be grown to fuller maturity before being reaped.

Mangoes.

From the commencement of the experimental shipments of the Jamaica Pairi mangoes in 1933, wastage has invariably occurred, running as high as 33⅓% in some instances, and rarely being less than 20%. Normally the fruit has been shipped at temperatures in the vicinity of 42°F. but other temperatures have also been tested with variable success. In 1935, due to the replacement of certain of the Jamaica Direct Fruit Line vessels by chartered ships, it was not always possible to obtain temperatures other than the usual banana temperature of 52-53 degrees F., with a somewhat protracted period of cooling down. Shipments made at this temperature invariably showed considerable wastage and overripeness on arrival in London; and on account of this a series or tests was carried out in the Experimental Cold Store. These tests covered ranges of temperature and fruit at various stages of maturity. Tests were also made of fruit gathered in various ways, and efforts were made to prevent fungus infection at the stem by various treatments. These experiments will be described in detail in a bulletin which will be prepared on the subject, and it is sufficient at this stage to give a summary of these results:—

(a) *Temperatures:*—Low temperatures resulted in delayed ripening and a poor ultimate flavour and poor colour of the flesh. Banana-Hold temperatures of 52°—53°F. invariably resulted, after 15 days, in an excess of overripe fruit and considerable fungus wastage, making in most instances 50% of the fruit unfit for sale, while practically the whole of the fruit remaining was sufficiently ripe that it would have to be consumed immediately. Temperatures between 45°-47°F. proved most suitable and yielded a moderate amount of ripes only, the bulk of the fruit being in excellent condition for sale and consumption within two or three days. No chilling of the Pairi variety was observed at this temperature. It should be recorded, however, that experience has shown that when once removed from Cold Storage the Pairi variety ripens rapidly, but provided the temperature and stage of maturity have been correct, the ripened fruit has as good a flavour as that ripened on the tree.

(b) *Stage of Maturity:*—Indian and West Indian workers have carried out experiments to ascertain the proper stage at which mangoes should be harvested so that they will withstand transportation and refrigeration and then ripen normally. The ripe fruit may be held for a few days in cool temperatures but not for a sufficiently long time to reach overseas destinations. In any case the ripe fruit is easily bruised or damaged, and for that reason is not suitable for export; nevertheless it is desirable to take fruit as near the ripening stage as possible so that it will arrive at its destination in a firm condition and on the point of ripening. Universal experience tends to show that a mango which is not fully developed does not ripen normally. The flesh will ultimately soften but it is darker in colour than normal and the flavour is acid. If too immature, the fruit does not ripen at all. In the case of the Pairi mango in Jamaica, experience has shown that provided the growth of the fruit is completed, the mango will ultimately ripen quite normally. In the other Islands where the Julie mango is more commonly grown, it is understood that the "floating test" is used to ascertain maturity in the fruit. This test is useless for the Jamaica Pairi mango as it is heavier than water at practically all stages of development. The workers in Bombay have found that full development of the fruit may be indicated by the shape of the "shoulder" of the fruit. Their observations appear to fit in quite well with experience in Jamaica where we have to admit that up to the present we still guage the maturity of the fruit by eye. The more experienced "pickers" are quite capable or doing this, and, though not infallible, several sets of experiments in the Cold Store proved that their judgement is well over 90% correct, and that what are known commonly as "full" mangoes arrive after 15 days cold storage at 45° to 47°F., 40% still hard but capable of ripening in 4 days, 10 to 20% turning and about 40% barely ripe and ready for immediate marketing. In the case of the "barely full" fruit, the percentage of of hard fruit is greater and some of these do not ripen normally, while the "very full" fruit arrives completely ripe with many fruits so overripe as to be unmarketable.

As the result of the wastage reported in shipments, Cold Storage tests were made with a view to overcoming the fungus infections at the stem end, usually caused by *Colletotrichum Gloeosporium.* In the first series of experiments fruits fruits at various stages of maturity were selected and each lot treated separately. In each batch, a portion was left in the same condition as reaped, i.e. with the dried gummy juice around the stem; a portion was washed and dried; a portion washed, dried and then the stems smeared with vaseline; a further portion was treated in a similar manner but warm paraffin wax substituted for vaseline. The experiments were repeated a second time and then repeated on fruit which had had the stems freshly cut before treatment, but in all these cases there appeared to be no significant differences between any of the various treatments and the fruit which was untreated. Parallel shipments of fruit with waxed and vaselined stems proved to be even worse than untreated fruit. Latterly a small quantity of fruit was precooled prior to packing and it is possible that this system may prove advantageous. It will be further tested in 1936.

Sweetsops and Soursops.

Two tests of these fruits at 46° F. and 52° F. for 14 days showed that these temperatures were unsuitable, mature fruit was chilled and the flesh turned a blackish-brown, while the immature fruit blackened during Cold Storage.

Naseberries.

Sundry small tests of fully developed but unripe naseberries showed that provided they are packed with sufficient woodwool to prevent bruising, these fruits may be kept perfectly at 45 degrees F. for several weeks. After Cold Storage, ripening sets in fairly quickly at the usual air temperatures of 80° to 90°F., but provided the fruit is fully developed the ripening process is normal. There proved to be some varietal variations, however, and in some types the ripe fruit was slightly "gritty." This, however, occurs in tree-ripened fruit in some cases. Slightly immature fruit ripened but the skin was shrivelled and the flesh lacked the normal fullness of flavour. With careful selection of varieties it is possible that an export market may be found for this fruit but experimental shipments have not yet been made.

Chochos.

This vegetable was tested on several occasions and kept perfectly for three weeks at temperatures in the vicinity of 45 degrees F. when packed in tomato lugs with thin pads of woodwool under the covers. The green varieties proved more satisfactory than the white ones, as the latter turned brown wherever the skin was evenly slightly bruised. While this did not affect the eating quality of the vegetable, it detracted from its appearance.

Vegetable Marrows and Squash.

The English Green Bush vegetable marrow, when wrapped in tissue paper and protected with a little woodwool, proved very amenable to Cold Storage at almost all temperatures from 36° to 52° F.

Small satisfactory shipments were also made.

The Long Green Jamaican Marrow-Squash proved unsatisfactory, possibly on account of the fact that it is normally reaped when immature. The skin is very tender and the slightest abrasion or bruise rapidly develops into an ugly brown blemish.

The American Squashes, Zucchini, Wood's Early Prolific (patty-pan squash) and the Boston Marrow were also experimented with under similar conditions to the English Vegetable Marrow. The two first named kept well for several weeks at 42 degrees F. but the Boston Marrow appeared to be too tender for commercial purposes.

Granadillas.

The very large Granadilla when reaped mature proved capable of withstanding temperatures of 47 degrees F. for a considerable time without deterioration. If taken at a less mature stage, however, the flesh was unpalatable after Cold Storage.

Beans.

A number of varieties of French Beans were tested in small quantities at temperatures between 40° and 50° F., being stored in chambers with constant moving air. A good deal of withering took place and it was found necessary to use waxed paper or cellophane to ensure maintenance of a plump condition in the pods. More suitable temperatures appear to be in the vicinity of 34 to 38 degrees F. and experimental shipments on this basis are contemplated.

The long stringless beans such as Cuban Asparagus, Yard Long and Old Homestead have so far not responded well to Cold Storage but further experiments are contemplated.

Carrots.

Small quantities of Carrots have been stored at 45 degrees F but a good deal of withering, both of the tops and of the roots themselves, was apparent after 18 days, due no doubt to storage in chambers with constant air circulation. Further experiments with this crop at lower temperatures are contemplated.

Radishes.

Radishes of the Red Turnip, Scarlet Globe and French Breakfast types have been tested at 45°, 47°, and 36°. At the higher temperatures, very considerable wilting has taken place but there is evidence that a successful method of preserving this vegetable at lower temperatures in the vicinity of 34 degrees will ultimately be worked out.

Avocado Pears.

The Avocadoes growing in the Colony are almost entirely seedling trees of the West Indian type. The shape, size and general texture of the fruit varies very considerably but on the whole these seedlings bear their fruit between August and November, Winter and Spring fruit being very rare. These varieties are quite useful for local consumption and in some instances may be exported short distances. The work of Wardlaw has indicated that the bulk of these West Indian varieties are unsuitable for export in Cold Storage and the experiments carried out in Jamaica amply confirm his findings. In all, fruit from 61 different trees was subjected to test and a portion of each lots was exported, while those retained in Jamaica were packed in the usual manner used for export. Tests at a temperature of 52° were also invariably unsuccessful. In many instances the fruit was in a soft and leaky condition after 14 to 16 days at this temperature. At 45 degrees F. the fruit was normally in a better condition and ripened in about three days, but the flesh usually blackened especially in the vicinity of the vascular strands. Even in instances where the fruit appeared externally to be perfect, the flesh was found to be discoloured on cutting. At 36° F. the fruit took a considerable time to ripen after Cold Storage and often showed signs of chilling.

It will be appreciated that being unable to obtain a regular supply of uniform fruit, and as the fruit available from time to time varied considerably in type, the experiments on temperatures yielded rather confusing results. On the whole it appeared that the smooth but thick-skinned, thick-fleshed type with a moderate neck and a tight small seed with stood cold storage best of all. Some of the long-necked, yellow-fleshed varieties, especially the "Butter pears," also ripened fairly well after storage. The round varieties, however, and especially those which normally have dark-coloured vascular strands, were found to be quite useless.

These tests showed, however, that no general reliance could be placed upon the selection of pears for export by their shape. The variations in similar looking fruit from different trees was so apparent after cold storage and subsequent ripening that it is clear that special varieties known to be capable of withstanding cold storage will have to be imported if an export industry is to be established with this crop, while the greatest care in cultivating the trees and reaping of the crop will be necessary. Further studies will also be required to ascertain exactly the right stage of maturity to gather the fruit—a question which has received attention but has not been entirely solved.

It is possible that some of the "wild" Jamaica types may prove suitable for export, but a long process of elimination of unsuitable types by trial and error will be necessary before a final pronouncement can be made. It is, therefore, obviously desirable to obtain supplies of varieties known to be suitable in Florida and other countries were this crop is grown.

Tomatoes and Other Crops.

Cold Storage tests had been commenced at the end of December with English varieties of tomatoes Irish potatoes and a number of other crops. It is anticipated that these tests, when completed in the Spring of 136, will yield results of some material benefit in connection with export developments.

Two Appendices, concerning the Import and Export Inspections of Fruits and Plants and the Advisory Committee on the Banana and Citrus Industries, are attached.

F. E. V. Smith, B.Sc.,
Government Microbiologist.

Inspection of Plants, Plant Material and Agricultural Machinery for the Year 1935.

A. The year 1935 is the first complete year for which records of inspection of plants, plant material and agricultural machinery are available. The inspection of fruits and vegetables was inaugurated on June 14th, 1934, and has been maintained without a break since that date. By Proclamation in the "Jamaica Gazette" of January 24th, 1935, New Zealand was added to the Schedule of the Customs (Importation Prohibition) Fruit and Vegetables Proclamation 1934.

B. *Inspections of imported Fruits and Vegetables.*

	Packages.
Passed for consumption in Jamaica	7,380½
Passed for transhipment	142
Refused entry	46
Destroyed	22½
Total packages dealt with	7,591

The reasons for refusing entry were:—	
No health certificate	25 packages
Presence of diseases and pests	18 "
Prohibited country or fruit	3 "
	46

The reasons for destruction were:—	
No certificate	15 packages
Diseases and pests	6½ "
Prohibited fruit	1 "
	22½

Pests and Diseases.

Fruit during the year was remarkably free from pests. San José Scale was recorded on apples and plums from the United States. Codling Moth and Peach Borer were seen occasionally. Apples in barrels were sometimes badly affected with Apple Scab.

Heavy infestations with Cabbage Aphis caused rejections of several crates of Brussels Sprouts and Cauliflower. Romaine (cos lettuce) was occasionally rejected because of aphids. Celery Blight was a frequent cause of rejection and destruction. Penicillium rots were fairly common on apples, grapes, plums and pears.

C. *Inspection of Imported Plants.*

	From the United Kingdom.	From Other Countries.	
		With Permits.	Without Permits.
Passed after fumigation and inspection.	171	165	15
Passed after additional treatment	36	109	4
Destroyed	1	1	38
	208	275	57

Grand Total: 540 packages.

The large total of packages requiring special treatment is explained by the inclusion of 93 crates of pineapple suckers imported by the Department of Agriculture from Fiji.

The United Kingdom total includes many packages of Dutch-grown bulbs imported from wholesale dealers in England.

Pests and Diseases.

Insect pests were found on the following occasions:—

(1) Scale insects on Orchids from Cayman Islands.
(2) Scale insects on Orchids from Guatemala.
(3) Beetles in package of Sorrel, Ginger and Beans from Canal Zone.
(4) Aphids on Cactus (Opuntia sp.) from California.
(5) Aphids on Tulip bulbs (Dutch produce) from England.
(6) Aphids on Chrysanthemums from England.
(7) Caterpillar in bulb from U.S.A.
(8) Tunnels of beetle borer in dried fruit from Australia.
(9) Scale insect on Orchids from Straits Settlements.
(10) Scale on Orchids from British Honduras.
(11) Ants in Orchids from Cayman Islands.
(12) Eggs (probably aphis) on raspberry canes from Scotland.
(13) Mealy Bug on Geranium from England.
(14) Mealy Bugs, Scale insects and Earwigs on Pineapple suckers from Fiji.

In some cases infected plants were destroyed, in other delivery was allowed after special treatment.

D. *Health Certificates Issued.*

During the year 33 certificates were issued covering shipments to England, Bermuda, Cuba, Colombia, Kenya, Tanganyika, Haiti, Trinidad, Panama, United States of America, Canal Zone, Guatemala and Barbados.

E. *Seed Potatoes.*

During the year 2,319 packages of Seed potatoes were passed. The total was made up as follows:—

England	2	packages.
Scotland	160	"
Irish F. S.	25	"
Canada	2,099	"
United States of America	33	"
Total	2,319	

F. *Agricultural Machinery.*

Six lots of agricultural machinery were examined and passed. Disinfection was given when necessary.

J. M. McEwen,
Agricultural Officer.
June, 1936.

Annual Report of the Advisory Committee on the Banana and Citrus Industries.

There was no change in the membership of the Committee during the year under review, the membership being as follows:—

Chairman, The Director of Agriculture,
Messrs. F. A. Cory,
G. J. Goble,
K. V. Abendana,
H. Braham,
D. T. Wint,
G. A. Hawkins,
T. J. Cawley,
M. O. V. Ffrench-Mullen,
P. Lindo,
The Secretary of the Jamaica Agricultural Society,
Secretary Mr. F. E. V. Smith, Government Microbiologist.

During leave of absence granted to Mr. Ffrench-Mullen, Mr. J. Roy Johnson attended the meetings.

During leave of absence granted to the Director of Agriculture, Mr. F. E. V. Smith acted as Chairman.

Two ordinary meetings of the Committee were held in Kingston and a special meeting was held in St. Mary in May.

The usual routine business of the Committee was transacted by means of circulated papers and the usual monthly summaries of incidence of Panama Disease were circulated.

The more important subjects dealt with by the Committee during the year were concerned with despatches from the Secretary of State in regard to efforts which were to be made to obtain a parasite from the Banana Borer from the East.

The special meeting held in St. Mary was held for the purpose of reviewing the Panama Disease situation in that parish as a result of the year's experiment in a modified treatment of the disease, involving the diseased root only. After considerable discussion of the matter, the Committee advised Government that a modified system of treating Panama Disease should be instituted for the whole Island under which the 9-root system should be maintained for the first three cases per acre in areas which are now either non-infected or very slightly infected, but that the Director of Agriculture should have full discretionary powers in the matter; that in other cases the diseased root only should be dealt with, but an area of 16 feet radius around the diseased plant should be marked off as a quarantined area but without the destruction of the healthy trees. This system of modified treatment was ultimately approved by Government.

The Committee also reviewed the situation in regard to the citrus nurseries and advised as to their extension.

The Committee also advised on the subject of the export of banana suckers and recommended that it would be in the best interests of the Colony that no seedling or other banana suckers should be permitted to be exported at this stage of the development of the banana breeding work.

The Committee recommended, and Government finally implemented the recommendation, for the establishment of a credit system by which potential citrus growers might be given loans for the establishment of groves of not less than five acres of approved varieties of grapefruit and oranges.

The Committee also recommended that no permission should be given for the landing and storing of citrus fruit from other countries.

The Committee attended the opening of the Low Temperature Marketing Station on May 23rd, 1935, and continued to advise on the operations of that Station and the system of working it as a Government Marketing Agency.

A summary of the incidence of Panama Disease for the year 1935 is given, as usual, as an Appendix to this Report.

F. E. V. Smith,
Government Microbiologist and Secretary to the Advisory Committee on the Banana and Citrus Industries.
June, 1936.

Incidence of Panama Disease in Parishes other than Portland in 1935.

Parish.	Total Trees.	Total Plots.	New Cases.	Recurrences.
St. Thomas	14,806	10,472	192	10,284
St. Mary	285,970	255,049	2,130	252,919
St. Ann	11,855	8,059	150	7,909
Trelawny	2,649	1,863	33	1,830
St. James	27,983	18,319	150	18,169
Hanover	544	290	37	253
Westmoreland	1,559	1,268	65	1,203
St. Elizabeth	391	198	46	152
Manchester	1,869	479	36	443
Clarendon	29,616	6,291	158	6,133
St. Catherine	36,368	30,209	1,123	29,086
St. Andrew	2,321	1,765	298	1,467
Total for 1935	415,921	334,262	4,418	329,844
Total 1934	229,170	154,178	4,271	149,907
Total 1933	141,174	81,406	3,206	78,200
Total 1932	121,722	65,495	3,371	62,124
Total 1931	96,213	55,537	3,102	52,435
Total 1912 to 1935 (Excluding Portland)	1,157,261	775,953	28,380	747,573

Monthly Totals.

	Total Trees.	Total Plots.	New Cases.	Recurrences.
January	48,251	38,260	422	37,838
February	44,951	36,240	769	35,471
March	40,033	30,851	523	30,328
April	39,159	29,954	163	29,791
May	36,911	28,952	325	28,627
June	30,322	26,172	298	25,874
July	25,517	21,147	120	21,027
August	21,038	17,916	269	17,647
September	24,819	20,496	278	20,218
October	28,194	21,977	421	21,556
November	37,202	29,786	492	29,294
December	39,524	32,511	338	32,173
Grand Total	415,921	334,262	4,418	329,844

F. E. V. Smith,
Government Microbiologist.

Citrus Development Loan Board.

Report of the Financial Year ending ending March 31st, 1936.

The Legislative Council on May 28th, 1935, passed a Resolution authorising advances for the purpose of developing citrus cultivation to individuals owning not less than 25 acres of land and who were prepared to plant not less than 5 acres or more than 20 acres in citrus trees. The Resolution permitted advances at 5% interest up to a total of £7,200 on the lines indicated in the Governor's Message to the Council, No. 20.

2. A Board consisting of the Director of Agriculture (Chairman), the Island Treasurer and the Crown Solicitor was appointed to administer the scheme and held its first meeting on August 9th, 1935. The Government Microbiologist was appointed to act as Chairman in the place of the Director of Agriculture. Applications were called for but it was found that it was not possible to bring the scheme into effect without legislation. In consequence, representations were made to Government which resulted in Law 31 of 1935 being passed by the Legislative Council.

3. In view of the desirability of putting the scheme into operation during the Autumn months, when climatic conditions generally are most suitable for planting operations, the Committee made advances to applicants who had been approved on an undertaking being given than an agreement under the Law would be signed by such applicants at a later date. This procedure was regularised by Section 7 of Law 31 of 1935.

4. The Law was brought into force on February 13th, 1936, and the Citrus Development Loan Board was formally appointed, consisting of the Government Microbiologist (Chairman), the Island Treasurer and the Crown Solicitor. The secretarial duties have been carried out in the office of the Microbiologist.

5. In granting loans the Board has taken due cognisance of the adequacy of the applicant's title to the land in question, and no loan has been granted without a satisfactory report by an officer of the Department of Science and Agriculture upon the land to be planted.

6. The scheme as originally presented to Council provided for advances at the rate of £5 per acre in the first year together with the value of the plants applied. The Board decided to pay the cash advances in two equal instalments, the second advance being payable after receipt of a certificate from an officer of the Department of Agriculture that the first instalment had been properly expended.

7. A statement of the transactions of the Board is attached to this Report in which it will be observed that 40 applications are still under consideration.

F. E. V. Smith,
Government Microbiologist and Chairman, Citrus Development Loan Board.
8th May, 1936.

Citrus Development Loan Board.

Summary of Transactions up to March 31st, 1936.

Applications for loans received			125
To plant in citrus			943 acres
Applications considered by Board:—			
Granted loans ..	24		
Refused	15		
Deferred	3		
	——		42
(Granted but subsequently withdrawn or refused—3).			
Applications withdrawn or ineligible ..			43
Applications still under consideration ..			40
			125

Applications have been finally granted for the planting of 157 acres with promises of additional 50 acres later if the first plantings are satisfactory.

Plants issued 7,559 valued at ..	£368	11	6	A
Advances made*	496	19	3	
Interest on loans accrued to 31.3.36	13	7	6	
Expenses for inspections, etc. ..	53	11	10	

* Include £11 19s. 3d. for recording fees in connection with agreements.

F. E. V. Smith,
Chairman Citrus Development Loan Board.
21st April, 1936.

I hereby certify that 'A' of this Report is correct. The Agreements in respect of the Loans have been inspected and have been found to be in accordance with the Law.

(Sgd.) F. B. Bond,
Acting Auditor General.
8th May, 1936.

(xiii) *Report of the Entomologist for the year* 1935.

Director,

I have the honour to submit hereunder a Report of the results of my activities during the year 1935 when I fulfilled the duties of my substantive post and I acted as Government Microbiologist until the end of January.

No destructive outbreak of insect pests have occurred during the year under review. For reasons mentioned below, steady progress, has however, been made in the field of applied entomology. Planters have become more interested in entomological problems and have on the whole given greater attention to the control of pests destructive to their crops. This is evidenced not only by the greater volume of advisory work done by correspondence but by the fact that at the request of planters more lectures were delivered and demonstrations made in the fields. Many are those who during the year have provided themselves with spraying instruments and who have given attention to the control of pests by rational methods of cultivation.

It is to be deplored that though during this year steps were taken to strengthen the protection of the Island against accidental introduction of pests from other countries, a pest new to Jamaica, *Taeniothrips gladioli*, was found established in the upper parts of Manchester. There are good reasons for believing that this pest was introduced on gladioli bulbs received from the United States; as it is known as being destructive only to plants botanically related to gladioli it therefore will according to all probabilities have but little economic significance for Jamaica. Measures have, however been taken so that the pest would be eradicated from the infested area, but as when it was discovered it might have been already distributed with nursery plants and cut flowers one can but hope that the measures which it was possible to take will meet complete success.

The situation with regards to pests attacking our main crops is recorded below under separate headings according to the crop affected. Matters of outstanding interest having been reported on in detail in separate memoranda reference only will be made to them in this Report.

Banana.

During the summer months storms and high winds again blew down a large number of banana plants, and this has unfortunately handicapped the efforts, now successfully made by many, to check the Borer by field sanitation and by trapping.

Where weather conditions have not been so unfavourable and where sufficient attention has been given to field sanitation the pest has not caused considerable depredations.

The problem created by the Borer has continued to receive sustained attention; in a special Memorandum submitted to the Director, the present situation and needs for the future have been fully explained. So far as banana is concerned the economic importance of this pest is increasing steadily, as the best lands are being gradually thrown out of cultivation on account of Panama Disease.

As on the poorer soils of the hilly districts its control by human intervention is not only very difficult but costs relatively much more in comparison with the value of the crops obtained per unit area, the advisability of trying to establish biological control has been emphasized.

Investigations which we have been conducting have revealed that the Giant Toad: *Bufo marinus* feeds voraciously on the adults of *Cosmopolites*. The check effected by that active predator on the multiplication of the borer is noticeable on plantations situated on the irrigated alluvial plains where, finding breeding places for the tadpoles, it consequently abounds.

In the drier hilly districts where streams and rivers, when they exist, flow in torrents during the rainy season and remain dry during long periods, toads are so few in numbers that their action is negligible. It has also been found that though *Bufo marinus* was introduced in Jamaica over 60 years ago it has not yet spread to certain valleys ecologically isolated by geographical barriers.

The local distribution of *Bufo marinus* is receiving attention and measures are being taken to establish it where it has not already spread by natural means.

By means of exhibits and lectures at gatherings of planters, and with the collaboration of other members of the field staff and Agricultural Instructors to whom all necessary information has been conveyed, cultivators are being taught to protect that useful animal instead of destroying it whenever found, as they were in the habit of doing in the past.

Apart from occasional outbreaks of the Aphis: *Pentalonia nigronervosa*, Coq., and of the Red Spider *Tetranychus sp.*, on the seedling plants grown in greenhouses no other pest has been observed attacking: banana.

Special attention has been given to the possibility of the crop being attacked by nematodes, but though the roots of banana plants growing on soils known to be heavily infested by *Heterodera radicicola* were frequently examined in no case have the roots of banana been found to harbour the pest.

Sugar Cane.

This crop has not suffered to an important extent from damage caused by insects. Occasional outbreaks of the West Indian Cane Fly: *Delphax saccharivora* and of the Green Leaf hopper: *Chlorotettix sp.* have occurred, as usual during the autumn months, but their sporadic increase in number were of short duration.

All the varieties of cane grown at the Experimental Station, Hope, were kept under observation with regard to the incidence of *Diatraea saccharalis*. The highest percentage of nodal infestation found has been 22.6% amongst the CO 213.

Coconuts.

During the whole year the crop has remained remarkably free of insect pests, all traces of scale insects mentioned during recent years having almost disappeared. In rare cases trees otherwise healthy were attacked by Shot Hole Borers, *Xyleborus perforans*, and by the local Rhinoceros beetle: *Strategus titanus*: this has occurred in districts where those insects have found extensive breeding grounds amongst the large number of trees which had died from Bud Rot Disease or from the effects of hurricanes.

Experiments undertaken in collaboration with the Soil Chemist with regard to the effect that cultivation and manuring have in connection with those mild ailments locally known as pencil points, etc., are in progress.

During an agricultural survey carried out in the Cayman Islands the pests and diseases of coconuts received special attention. This matter having been fully dealt with on a comprehensive report on the investigations I conducted, the observations already submitted will not be repeated here.

Coffee.

Where no measures had been taken to keep the Green scale: *Coccus viridis* G., under control it caused caused considerable damage during the months when the entomophagous fungi: *Cephalosphorum lecani* is not prevalent.

Planters who have applied Pyrethrum-Kerosene mixture as we recommended, atomized on the few insects remaining on the plants after the pruning season, and who have simultaneously had the infested prunings destroyed whilst the wild host plants had been eliminated from their plantations, have not suffered from the pest and have found that its control is economically possible.

The practice of taking seedlings growing under the older plants and which originate from berries which had fallen prematurely as a result of the incidence of pests or diseases continues to have deplorable effects. With regards to the Green scale, infested planting materials are thus transported to new grounds where previously it did not exist. The establishment of regular nurseries to provide planting material is in that respect, and also from every other point of view, very desirable.

Citrus.

Scale insects have not on the whole caused serious damage, fruits received at packing houses have been exceptionally clean, and rejections from this cause negligible.

Though many growers have been controlling those pests in a systematic manner, the relative scarcity of all scale insects, except *Cocus viridis*, during the year can be mainly attributed to atmospheric conditions.

Though, as aforesaid, spraying is gradually becoming an agricultural routine in citrus cultivation, difficulties are met to educate the small growers. The first power sprayer seen in the Island has been imported during the year by one of the more progressive planters and more of the smaller instruments than there were in the past are now in use. It is however, felt that until the Agricultural Instructors are are provided with adequate instruments for demonstration and for lending to the small grower on condition that he would soon purchase his own, progress will be slow.

Under local conditions the question of compulsory spraying, on parallel lines and for reasons similar to those which have prompted compulsory dipping of cattle, is a question which might have to be considered as soon as such measures are warranted by the development of the Citrus industry.

Investigations with regard to the Infestation of Cultivated Plants by Nematodes (Heterodera radicicola).

Eelworm have proven a serious pests of vegetables on the Liguanea plains.

Opportunities for studying the incidence of the pest have been frequent with the vegetable experimental plots which were established during the year. Advantage of this was immediately taken to study the relative susceptibility of various vegetables towards the root nematode *Heterodera radicicola*. Soon after observations had been systematically started the great importance that the pest has locally was realized, and the experiments originally planned were extended to include the study of the incidence of the pest with reference to plants which are now being generally used for green manuring. Observations were also frequently made to elucidate whether that pest affects banana.

With regards to vegetables it has been found that on the Liguanea plains *Heterodera radicicola* is very destructive and will probably be an important limiting factor to the production of Tomatoes, Eggplants, Beetroots, Cantaloups and Cucumbers, while Peppers and Cabbages suffer to a lesser extent.

With reference to Tobacco the pest is also destructive but the high incidence of mosaic and the low grade of tobacco generally produced continue to overshadow in the eye of the grower, the stunting effect due to attacks of Eelworms.

A forcibly limited number of varieties of plants grown for green manuring were also tested with regard to their susceptibility or resistance towards nematodes. Whilst *Crotolaria spectabilis*, *Crotolaria usaramoensis* and *Tephrosia candida*, planted on heavily infested soils have not become infested, the local Cow Pea and Jerusalem Pea proved to act as dangerous hosts as even when grown on slightly infested soils they soon become heavily infested. The danger of using those legumes for green manuring has thereby been demonstrated.

Banana, Ginger, Cassava (bitter and sweet), Susumber, *Solanum torvum*, (on which Eggplants can be grafted) and shallots growing on heavily infested soils have not harboured the pest.

An experiment to test the efficiency of Cyanamid for the control of Eelworms was conducted on nine plots situated at Waltham Park where Tomatoes were grown as indicators. Even where the doses of cyanamid reached 1,000 lbs. per acre the fertilizer did not prevent such heavy infestation of the plants that no crop of commercial value was obtained.

Observations are being continually made to gather information on the weeds which harbour this pest. Up to the present the following have been found carrying heavy infestation:—

Heliotropium parviflorum—Natural Order: *Borragineae*

Boerhaavia hirsuta—Natural Order: *Nyctaginaceae*

and the weed locally known as 'The Devils Horse Whip':

Achyranthis indica—Natural Order: *Amarantaceae.*

The Fruit Fly: Anastrepha longimacula, Greene.

Observations started during the previous year to estimate the intensity of the population of the Mango Fruit Fly (*Anastrepha longimacula*) during the months when the cultivated varieties of mangoes are in bearing and also during other seasons when Bombay mangoes are not in bearing were continued. For that purpose a definite number of traps were kept baited with liquids attractive to the fruit fly; the traps were visited at regular intervals and records of the captures kept.

On the annexed graph captures effected with three different kinds of lures have been plotted. It will be seen that though during two successive years the peak in the intensity of the fly population has been reached during the Bombay mango season, the fact that the 'common mango' trees, which grow wild amongst rank vegetation, frequently bear out of season and also on account of the abundance of other hosts such as Guava, adults of the fruit fly are found all the year round. Under such conditions the destruction of infested mangoes in cultivated groves will yield but insignificant results. So long as the pest will find an abundance of food amongst the surrounding rank vegetation, biological control or the treatment of the infested fruits so that the eggs or young maggots would not develop therein during transit appear to be the method that would yield the more important economic results.

Truck Crops.

With the opportunity afforded by the new vegetable experimental plots attached to the Low Temperature Experimental Station, sustained attention has been given to insects attacking vegetables.

Whilst numerous experiments followed by demonstrations were carried out in connection with the control of pests by applications of insecticide or by other means, special attention has been given to their seasonal occurrence and to the environmental conditions which indirectly favour their multiplication. Valuable data have already been obtained in such connections.

Trials carried out on a small scale have demonstrated that whilst it remains almost impossible to control economically certain pests such as those aphids and Lepidopterous pests which attack cruciferous and cucurbitaceous vegetables during seasons when intensive outbreaks commonly occur, by early or late planting and by adequate field sanitation those crops can be profitably grown without suffering serious injury from insect pests.

As experience on that aspect of the problem has, with regard to new crops, been acquired during only one year it would, at this stage, be premature to draw conclusions in many cases. It is felt, however, that by gathering data along such lines it will be possible to furnish information of practical value to those who desire to undertake vegetable growing on a commercial scale and to demonstrate to gardeners the value of acquiring such experience by personal observations made in their own districts as in a country like Jamaica where climatic and others environmental conditions differ considerably according to localities generalities cannot be made.

With reference to the work accomplished in connection with pests attacking vegetables I feel that I should express my indebtedness to the Microbiologist and to the subordinate officers attached to the Low Temperature Experimental Station for having constantly brought to my attention all the insects they have found in the experimental plots under their direct supervision. The keen collaboration of those officers and that of the Superintendent of Public Gardens and of his assistant have allowed me to cover considerable ground.

Amongst the pests recorded the following are of special interest:—

The Coreid: *Zicca taeniola*, (Dall.) which was found attacking Tomatoes at Cockburn Pen.

The Leaf Hopper: *Eposca fabalis* and the Thrip: *Frankliniella insularis* which when left uncontrolled caused considerable damage to Beans during the early months of the Autumn.

A severe outbreak of the Coreid: *Anasa scorbituca*, a close relative of the American Squash bug: *Anasa tristis*, caused great damage to plantation of Squash at Cockburn Pen.

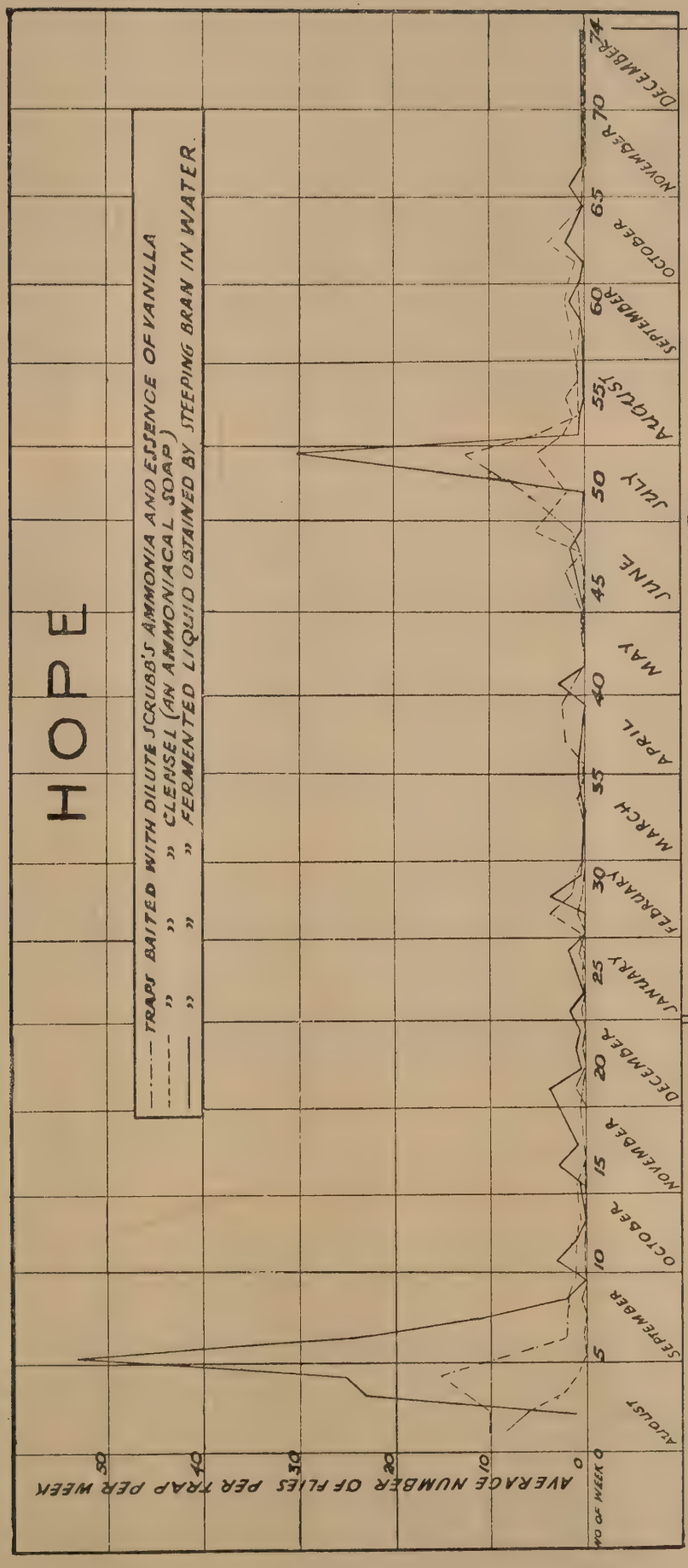
Control of that pest presented great difficulty as it is very resistant to the action of the most powerful; liquid insecticides.

Considerable success has been achieved in the control of the Pyralid: *Margaronia hyalinata* which used to be very destructive to melons, cucumbers and other cucurbits, by regular sprayings with Synthetic Cryolite-Whale Oil Soap solution.

Progress in Applied Entomology.

Having just mentioned the interest taken in entomological problems by the officers who have recently joined the staff of this Department, the writer desires also to mention how very gratifying it has been for him to witness the interest which the locally recruited field officers of this Department and those of the Agricultural Society have displayed with regard to entomological problems.

The fact that during the period under review there has been no difficulty in keeping the extensive nurseries of this Department in excellent sanitary condition with regard to parasitic insects also demonstrates the very material progress which has been achieved in the training of the younger elements of the community towards progressive methods of Agriculture.


HOPE
TRAPS BAITED WITH DILUTE SCRUBB'S AMMONIA AND ESSENCE OF VANILLA
" " " CLENSEL (AN AMMONIACAL SOAP)
" " " FERMENTED LIQUID OBTAINED BY STEEPING BRAN IN WATER.
AVERAGE NUMBER OF FLIES PER TRAP PER WEEK
0
10
20
30
40
50
NO OF WEEK
5
10
15
20
25
30
35
40
45
50
55
60
65
70
74
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
YEAR 1934
1935

The value of the results that are being obtained cannot be under-estimated by those who, like the writer, had in the past seen with concern that the practical or immediate value of their activities with reference to the diffusion of knowledge in agricultural technique amongst the masses was jeopardized by lack of assistance in the laboratory and still more so in the field.

The results of the policy inaugurated and steadily developed within the last two years and which consists in strengthening the links between laboratory and field staffs by arranging that the agricultural officers working in distant localities would come periodically in touch with those working at Hope, has thus already yielded material results.

The number and quality of inquiries received from planters, the large number of requests to attend meetings of planters to discuss specific entomological problems as have been received from the District Branches of the Agricultural Society indicate that the rapidly developing desire to learn improved methods is envinced from all quarters. I feel that such a gratifying evolution is not only due to the efforts which I have made to disseminate information by means of lectures and publications in popular language, but to the fact that the field officers who now attend regular courses of instruction, being themselves more keenly interested in technical problems, are giving the good example to these agriculturists with whom they daily come in contact.

The Staff Conferences, the Courses of Lectures delivered at Hope during the Summer, the Courses on special subjects such as Bee Keeping, Citrus, etc., which have been held during recent years are thus having a marked effect on the extension of the activities of the Entomological Division.

Miscellaneous.

Half-yearly meetings of the Jamaica Agricultural Society and of affiliated Branches were attended when various entomological problems were discussed.

At meetings of planters and during the Summer Course of Lectures and demonstrations held at Hope, the subjects treated have included the control of agricultural pests by agricultural practices, by natural enemies and by means of insecticides. During the 'Citrus Day' held at Grove Place, various types of spraying apparatus were exhibited and used in the fields. Demonstrations were made to show how insecticides should be used to control pests which commonly attack Citrus in Jamaica. At the special request of planters of St. Elizabeth a lecture on the 'Control of Insects which attack Stored Grains in Jamaica' was delivered during the Half-yearly meeting of the Agricultural Society Branches of that parish and exhibits displayed.

At the All-Island Agricultural Show held at May Pen, exhibits of entomological interest were displayed and verbal information given to those interested and literature on specific subjects distributed.

Numerous questions submitted by the officer in charge of the Plant Quarantine Service were considered and recommendations submitted to the Director of Agriculture.

Citrus Packing houses were inspected and recommendations made in individual cases with regards to the possibility or advisability of fumigating fruits therein; the question as a whole has been dealt with in reports submitted to the Director of Agriculture.

The archives in the Island Record Office at Spanish Town were fumigated and the files at the Colonial Secretary's Office treated against insects' attacks.

The number of visitors received at the laboratory to discuss specific problems has increased steadily though interviews in the fields have also been more frequent. The volume of advisory work effected by correspondence has during each of the years 1934 and 1935 increased by over 100% over the preceeding years.

The following Special Reports or Memoranda were submitted during the year:—

An Agricultural Survey in the Cayman Islands.
Progress in Applied Entomology in Jamaica during the last five years.
The Situation with regards to Pests attacking Citrus in Jamaica.
The Economic Status of *Cosmopolites sordidus* in Jamaica.
Pests attacking Pineapple.
Pests attacking Stored Grains.

W. H. Edwards,
Government Entomologist.

(xiv) *Report of the Agricultural Chemist.*

1. *Introduction.*

The work of this division of the Department during the year under review has been a continued investigation of the main soil types of the island. Where it has been possible, special investigations of problems affecting particular plantations have been made. The interest in the soil investigation has been maintained, and the number of soils examined is only limited by the number of samples which can be handled by the staff of the Laboratory.

The use of fertilisers is becoming a general practice in many of the larger plantations, and the Division has been able to give advice to planters who contemplate using manures.

It is to be regretted that very little reliable data on the comparative results of the using of these fertilisers is available. Planters should realise that their observation, however experienced, may easily lead to conclusions which could not be verified if proper records of the ultimate yields were kept. This division of the Department is ready to give any assistance which a planter might need in the selection of his fertilisers and the planning of simple trials which would give him some indication of his manurial requirements, and the results he is likely to obtain from their use.

The increase in the interest taken in the chemical control of the Sugar Factories is very striking. In 1933 of 34 factories operating, only 8 factories had any sort of control. During the 1935-1936 crop arrangements have been made for the complete or partial control of 27 factories. Two of the factories which have no control are assisted by this Laboratory by the occasional analysis of their juices and other products.

The Laboratory has supplied standard solutions and indicators when necessary, and has been able to assist the factory chemists by supplying materials which they were unable to purchase locally.

2. *Soils.*

The number of samples examined during the year is somewhat less than in the preceeding year, as the absence of the Agricultural Chemist on leave considerably reduced the staff available for analytical work. It was thought advisable to delay the investigation of any new areas until the return of the Agricultural Chemist, in order to have a continuity of opinion of the interpretation of the problems incident on the investigation of these soils.

In the sugar cane soils many samples have indicated that the low yields on some plantations are due to the comparative high acidity, and recommendations as to liming have been made.

A series of samples have been examined for the Jamaica Hookworm Commission with a view of deter mining if any connection can be established between the incidence of hookworm and the general soil conditions. The data for this work has not been completed, but is hoped to issue a report in 1936.

The presence of areas with high saline contents in the southern plain has again been confirmed by a series of analyses. This salinity would affect the growth of bananas, and it would be advisable for any any prospective planter in the area to have tests made before embarking on a planting programme.

Summary of Soil Samples.

Total No. of pits examined under 2′ and 6′ depth	65
Total number of samples examined ..	502

3. *General Agricultural Analysis.*

The interest in the local bat guanos continues, but it is apparent that the available supply of good guano is becoming exhausted as very few of the samples now being submitted have any value beyond their content of phosphoric acid. Samples of guano prepared from fish and the droppings of birds on the adjacent cays were examined, but it was apparent that the deposits had suffered, from bad preparation and leaching, as nearly all their nitrogen had disappeared.

Summary of Agricultural Analyses.

Bat and organic manures	25
Irrigation waters	13
Limestone and liming material	21
Molasses and distillery products	9
Miscellaneous agricultural products ..	21
Cane juices	27
Total	116

4. *Citrus Maturity Tests.*

The tests begun in 1934 were continued until the end of the citrus crop. The results of the investigations were summarised in Departmental Bulletin No. 5 (New Series), and published during the year. It is proposed to continue these investigations during the next citrus crop.

5. *Statistical Work.*

The statistical work undertaken in this Department, in co-operation with the Sugar Manufacturers' Association has been continued. The Cane Yield Survey for 1934 was issued as Departmental Bulletin No. 4 (New Series). The Survey for the 1934-1935 crop is in preparation.

The circulation of the Factory Data has been continued, and the Sugar Manufacturers have expressed their appreciation of this service.

6. *Advisory Work.*

We were consulted by planters and others on various problems dealing with soils and fertilisers. The growing interest in the use of fertilisers was shown in the amount of enquiries which we had with reference to their application.

7. *Field Experiments.*

(a) *Sugar Cane.*

(i) *Manurial Experiments.*—The experiments which were started in 1933 were continued during the year under review. The results of these experiments have been recorded and have been distributed to the planters concerned. These results confirm the findings of the previous years.

Experiments were conducted on both plant canes and ratoons.

Number of experiments reaped	6
Number of experiments continued until 1936 and relaid during 1935	6
Varietal experiments laid down	1

One experiment was lost owing to the damage by rats and other causes. The two experiments laid down in 1934 will be reaped in 1936. The results of these experiments will be published separately.

(ii) *Varietal Experiments.*—The three variety experiments laid down in 1934 will be reaped in 1936. One experiment was laid down in 1935.

(b) *Banana.*—It is to be regretted that the storms which occurred during the latter part of the year have again destroyed the experiments before the total crop had been reaped. A certain amount of data has however been recorded from the St. Mary experiments which should be of value. The St. Mary series of experiments also suffered from the severe drought which occurred in the area during the first six months of the year. It is doubtful if the manures could have reacted during this period when there was practically no rainfall. No records were obtained from the plots at Grove Place and in St. Thomas of the yields prior to the storm.

(c) *Coconut.*—The trials in St. Mary with fertilisers on coconuts were also destroyed by the storm. Some of the large nuts were blown off the trees, and nearly all the nuts in the early stage of its formation destroyed.

A small cultivation and manurial trial was conducted in an area of coconuts in St. Thomas where the trees were in extremely poor condition and yields had diminished considerably in the last few years. The treated trees presented a distinctive and greatly improved appearance twelve months after treatment. The number of young bearing spathes was greater than those on the surrounding untreated trees. The results warrant a more extensive trial of cultural methods in this area.

(d) *Citrus.*—The minor trials on the effect of the application of artificial on the growth of young citrus plants are being continued.

A large scale experiment to test out the effect of fertilisers on the growth and productivity of citrus has been established at Grove Place. It is proposed to continue this experiment for a long period, and selection, location and planting of the experiment have been done with this object.

(e) *Minor Crops.*—Experiments were conducted at Grove Place on the effect of fertilisers on the growth of Potatoes and other minor crops. The results of these experiments were not complete at the end of the the year.

R. S. Martinez,
for Agricultural Chemist.

(xv) *Report of the Government Geneticist.*

I have the honour to submit hereunder my Report for the year 1935.

1. Introduction.

This Report covers the work of this division during the whole year although the Geneticist was absent from the Island for five months on vacation leave, departing on May 21st and arriving back on October 24th. During this period the Supervising Inspector of Plant Diseases continued to supervise the banana breeding work and culture of seed and seedlings.

The programme of work undertaken during the year under review is essentially similar to that laid down in 1934 and reported on at the end of that year. The main line has been the crossing of the Gros Michel banana with *Musa acuminata* Colla. to raise seedlings immune to Panama disease, and has been followed up by raising backcross and F2 generations. The cytological investigations which have accompanied this work have revealed facts sufficient in themselves to explain, among other problems, the high sterility of the the edible bananas, and to justify breeding on the extensive scale which has been adopted. All new breeding plots started last year have come into use during 1935, and furthermore, have yielded viable seed. Further breeding plots are, however, in process of establishment for reasons stated below.

Weather conditions in general during 1935 have not been quite so favourable as during 1934, with the result that the proportional production of new seedlings has not been quite so high; the gross production however shows a considerable increase owing to the extensions of the work mentioned.

High winds which struck the Island on September 27th and October 21st did considerable damage to to the breeding plots, a loss of over 900 plants being sustained; of this number over 400 bore pollinated fruit.

The erection of a greenhouse, 40 feet long by 10 feet wide, was commenced in December, 1934 and completed on February 25th. This building has proven of inestimable value in the germination of seed and care of young seedlings which is reflected in the greatly increased percentage germination and low mortality in the early stages of growth.

The appointment of a Technical Assistant to this division on May 7th has enabled the cytological work and other activities in the laboratory to be carried out with greater expedition, and the scope of this work to be widened.

2. Banana Breeding.

(i) *General.*—The policy laid down in 1934 of increasing the number of breeding plots and locating them as remotely from each other as possible, as an insurance against the effects of local storms, has proved effective and has been extended during the present year. Arrangements for a further breeding plot in East St. Thomas have been made; the male parent was planted in February, is now established, and breeding will commence in 1936. 'Northers,' whose effects are often restricted to a small area of the country, not only cause the loss of pollinated bunches and therefore of potential seed, but destroy plants due to shoot (flower) in two to three months and so reduce material for future pollination. The winds of September-October felled all the breeding plants in the Coleraine district, and at Castleton, and though considerable damage was done at Crawle and Grantham, it has been possible to continue breeding at the two latter plots. The seedling collections at Hope and Coleraine were practically undamaged.

It is proposed to extend the breeding work at Castleton, which of all the plots is still the most productive of seed: for this purpose a further $\frac{3}{4}$ acre was planted in February, mainly with the Highgate variety; this variety being chosen on account of its short stature, and therefore possible wind resistance, of the promise shown by hybrids so far raised from it, and of cytological findings discussed below.

In December a commencement was made on establishing a further 1 acre plot of Highgate plants at Gibbs Hill in St. Mary; this plot will not however become available for pollination until 1937. In the same month, in view of the heavy loss of available plants at Coleraine, pollination was commenced on 1 acre of S.19 which had till then been incorporated in the seedling variety trial.

One condition affecting the fertility of banana flowers is dependent on the weather as is shown by the following figures accumulated over three years. The crosses effected in each of these years were, with minor exceptions, similar. The figures, except where otherwise stated represent numbers of bunches.

Year.	Bunches. Pollinated.	Lost.	Reaped.	Fertile.	Percentage Fertile.	Number of seed.	Seed per fertile bunch.
1933 ..	401	68	333	32	9.697	104	3.250
1934 ..	1,472	64	1,408	184	13.070	911	4.951
1935 ..	1,957	418	1,437	141	9.812	537	3.808

It will be noted that 1934 was proportionally the most productive year, and that the high seed production of 1935 as compared with 1933 was almost entirely due to extension of breeding plots.

Caymanas in St. Catherine is the only area in which breeding work has had to be discontinued. Pollination was commenced there in April, 1934 and continued until August, 1935. During that time in the section devoted to crossing with Gros Michel, no seed were obtained, and in the section in which F1 seedlings were crossed *inter se* only 15 seed were yielded. This low set was attributed to dry winds affecting the germination of the pollen on the stigma.

The extensions of breeding plots designed in 1934 have yielded a full return this year, as is shown in the following table which summarises the result of pollinations for the last five years.

Pollinations, 1931-1935.

Year.	Bunches Pollinated.	Seed Obtained.	Seed Germinated.	Seedlings Established.
			(Prior to 1931)	22
1931	127	5	35	27
1932	1,379	103	13	3
1933	401	6	1	0
1934	1,472	650	56	1
1935	1,957	896	253	89
			Total	142

These figures show a substantial increase in bunches pollinated during this year with a corresponding increase in the seed yielded and number of seedlings raised. The entries opposite each year comprise figures computed from January 1st to December 31st and in consequence each entry in Column II includes seed from bunches pollinated in the previous year. The third column involves a further lag, as seed require from one to twelve or more months to germinate. The fourth and final column represents only those seedlings which have been planted out in the field. It had been hoped to pollinate 2,500 bunches during 1935, but, owing to the winds of September-October, beside the 418 pollinated bunches lost, a further 537 plants (21.14%), many of which should have been available for pollination in November and December, were also lost; only 102 pollinated bunches remained unharvested therefore, at the end of the year, and all of these had shot in the last two months.

(ii) *Breeding Lines.*—The main breeding lines laid down in 1934 have been continued without alteration; these involve raising an F2 generation (the original cross being Gros Michel x Robusta), backcrossing the best F1 plants to the female parent, and thirdly, the cross between Gros Michel and *Musa acuminata*. The use of a second clone of *M. acuminata* in this last cross, commenced last year, has provided a good supply of seed as is shown by the following figures, which summarise the various crosses carried out. Figures in the last column refer to seed from bunches pollinated in 1934 but reaped this year; other figures are all pertinent to the year under review.

Summary of Pollination, 1935.

Female.	Cross.	Male.	Bunches. Pollinated.	Bunches. Lost.	Bunches. Reaped.	Fertile Bunches.	Seed obtained. 1935.	Seed obtained. 1934.
J.	x	ZA	244	50	164	38	76	52
J	x	K	200	46	154	36	132	74
J	x	F1	942	185	712	18	22	5
F1	x	F1	507	102	378	45	226	228
3n	x	F1	34	22	12	1	1	0
3n	x	K	17	12	5	0	0	0
Sundry			13	1	12	3	80	0
	Total		1,957	418	1,437	141	537	359
		Pollinated in 1934:—			635			
				Total	2,072		 896	

The letter J (Jamaica) is used to indicate the type variety Gros Michel together with its sub-varieties, Highgate (H), Pink Jamaica (PJ), Plantain Jamaica (PltJ), Weeping Jamaica (WJ), Glengoffe (GG), Free Hill (FH), all of which are triploid. Other varieties are referred to as follows, K—*Musa acuminata* Clone B., ZA—*M. acuminata* Clone A., R-Robusta, Fill.-Fillbasket, 3n-other sterile triploids, and F1-first generation seedlings; their chromosome numbers are indicated in section 3 of this Report. All the male parents used in the crosses cited above are immune to Panama disease.

Crosses using the variety Robusta, discontinued in 1934, have not been resumed on account of their their high infertility. J x R yields 2.44% fertile bunches as against 23.27% in J x *M. acuminata* and 11.90%in F1 x F1.

It is proposed in 1936 to commence two new lines with the crosses J x *M. acuminata* Clone E, and J x *M. brachycarpa.*

(iii) *Germination.*—During the year under review 253 seed have germinated. 21 seedlings have died in early stages of growth and of the remaining 232, 89 have been planted out in the field, 143 remaining in seed boxes and pots. The availability of the greenhouse mentioned above has greatly facilitated the care of seed and young plants which is tangibly shown in the increase in germination. In 1934 the mean germination of all seed planted was approximately 12%, during this year the rate has been raised to over 23%, a substantial increase.

The influence of parentage on germinability is demonstrated by the following computation of records of the last three years. This effect evidently overshadows that due to aberrant chromosome constitution as the cross J x *M. acuminata* yields a higher proportion of aneuploid seedlings than either of the other crosses quoted.

Cross.	Number of Seed.	Number germinated.	Percentage germination.	Mean period of germination.
J x M. acum.	516	155	30.04	78.04 days.
J x F1 ..	46	10	21.74	110.80 "
F1 x F1 ..	770	128	16.62	103.01 "

The mean germination period, i.e. the lapse of time between planting (the seed is planted fresh from the fruit) and germination, is high. The minimum period is generally between 20 and 30 days and the majority of germinations have occurred within 50 days of planting.

(iv) *New Seedlings.*—It is impossible to form a considered opinion of new seedlings until at least the first ratoon bunches have shot. Even in the first few months of life, however, great variation in growth characteristics is discernable. The first seedling of the new series was planted out on February 5th; since then a further 88 have been planted, of which only 2 have died. These seedlings are derived as follows—

PJ x K	20	S. 5 x R ..	1	S. 5 x S. 7 ..	7
J x K	5	S. 7 x R	1	S. 40 x S. 19 ..	1
H. x K	4	S. 20 x R ..	3	S. 20 x S. 7 ..	8
WJ x K	2	S. 7 x H ..	1	S. 17 x S. 7 ..	1
Plt J x K	3	FH x S. 7 ..	1	S. 7 x S. 19 ..	3
J. x Z A	3	S. 7 x S. 7 ..	12	S. 40 x S. 7 ..	1
Fill x K	2	S. 20 x S. 20 ..	1	S.— x S. 19 ..	3
H. x R	1	S. 19 x S. 19 ..	3		
				Total	87

(Reference to the abbreviations used is given above in ii.)

Among the most vigorous of these are the seedlings derived from the cross H x K. These have short stout petioles, and it would appear possible, therefore, to overcome one of the more serious defects of the best of the earlier seedlings whose leaves are frequently broken in moderate winds due to the thinness of the leaf-stalk at its insertion with the 'trunk.'

(v) *Plant Introductions.*—Banana material imported in 1934 in the form of suckers and seed has in general grown well. The varieties Giant Governor, Palembang, Guindy (which has proved to be identical with the variety known as Apple in Jamaica), Bande and *M. acuminata* C, D, F, and G, are all well established 'Calcutta 4' is also growing vigorously and is being bulked for breeding. 'Calcutta 6' and 'Samoa' have suffered heavily from attack by the Black Weevil Borer, *Cosmopolites sordidus,* and few healthy suckers have survived. Seed of *M. Ensete* germinated well but the species proved impossible to establish at Hope.

The search throughout the Island for variant forms of Gros Michel is being continued, and this division is indebted to the field officers of the Department and of the Agricultural Society for their co-operation in this work. Suckers from two possibly new forms were received during the year, bringing the total to five undergoing a comparative test with the type of this variety.

3. Musa Cytology.

With the resumption of the production of seedlings towards the end of 1934 it has become possible to recommence the determination of chromosome counts, and this work is now closely following up the raising of new seedlings. During this year 127 cytological fixations have been made and 78 new seedlings counted, approximately 30 fixations remaining to be dealt with. The chromosome counts promise to have an important bearing on future breeding and are therefore listed below. In this list the number of the seedling e.g. J121, derived from each cross is followed by its somatic chromosome number in brackets. The basic number of the genus X is 11, and the first group is therefore a cross between two tetraploids. Seedlings of the new series, raised since 1932, are numbered J 120, J 121 etc., those of the old series, raised prior to 1932, are numbered S7, S19 etc.

*F*1 x *F*1	(4X x 4X)	
S7 x S7.	..	J121 (44); J122 (43); J124 (43); J128 (44); J130 (44); J133 (44); J142 (44); J166 (44); J170 (44); J223 (44);
S7 x S19.	..	J150 (44); J207 (44); J222 (43);
S19 x S19.	..	J125 (44); J167 (44);
S20 x S20.	..	J123 (44);
S20 x S7.	..	J138 (44); J154 (44); J156 (23);
S17 x S7.	..	J137 (44);
S40 x S7.	..	J157 (44);
S40 x S19.	..	J126 (44);
S5 x S7.	..	J153 (33); J161 (44); J198 (33);
S— x S19.	..	J204 (44);
J x *K*	(3X x 2X)	
GM x K.	..	J160 (44); J162 (77); J173 (44);
GM x ZA.	..	J194 (44); J— (44);
H x K.	..	J163 (44); J208 (44); J— (44);
PJ x K,.	..	J155 (77); J158 (75); J169 (77); J209 (74);
PltJ x K.	..	J152 (33); J168 (35); J195 (61); J— (73);
WJ x K.	..	J149 (70);
Sundry.	(4X x 3X)	
S7 x H	..	J127 (43);
S5 x R.	..	J205 (33);
S7 x R.	..	J171 (44);
S20 x R	..	J132 (44);
	(3X x 2X)	
Fill x K	..	J146 (44);
	(2X x 4X)	
ZAxS19	..	2 plants (32) 23 plants (33) 4 plants (34)

The last cross listed ZA x S19, was carried out to determine the chromosome number of the pollen of S19 As *M. acuminata* is diploid with pollen invariably containing 11 chromosomes, it follows that S19 pollen is predominantly diploid; from the similarity in chromosome number of hybrids in the first group listed, F1 x F1, it is highly probable that both the egg cells and pollen of most of the F1 plants also contain 22 chromosomes. Notable exceptions are the seedlings J153 and J198, from the cross S5 x S7, which considered in conjunction with J205 strongly suggest that S5 tends to produce haploid eggs. Other cytological considerations which have an important bearing on breeding may be found in the second group of crosses, from which it follows that both the Pink Jamaica and Plantain Jamaica tend to produce heptaploid seedlings (which are of inferior growth and undesirable) and that breeding should be concentrated on the type variety Gros Michel and on Highgate.

This investigation is at present very incomplete, but has been referred to here to demonstrate the important bearing that it will have on banana breeding. It is proposed to publish a full account of the results of this work and their significance at a later date.

4. Banana Variety Trials.

(i) *Economic.*—Seedling variety trials laid down in 1933 and 1934 have been continued during the present year with few alterations. The one acre plot of S19 at Coleraine, as stated above, has been used for breeding purposes since December. The S19 plantings at Coleraine are being increased by approximately 5 acres. On May 15th 2 acres were planted with S19 suckers from the plot at Caymanas, which was replanted. As suckers become available these 2 acres will be extended to the proposed 5 to enable larger trial shipments of fruit to be made. The winds of September-October destroyed all the standing fruit at Coleraine and Orange Hill, but the new planting at Coleraine was undamaged. Other plots remain as listed in the Report of this division for 1934.

No changes in the acreage of plots in China bananas (*M. Cavendishii*) have been made; this remains at 8 acres.

Several small shipments of S19, Highgate and China varieties have been made during the year. These shipments have been carried out by the Low Temperature and Marketing Experiment Station and an account thereof will be found in the Report of the officer in charge of that division of this Department.

Of the later seedlings undergoing test, two, S118 (GM x S7) and S95 (GM x S5) show promise; the former on account of its robust habit, and the latter on account of the fruit shape, the fingers tending to be tapered distally, a desirable feature. Fruit size and weight in the plants however, is disappointing, and it is hoped that ratoons will yield heavier stems. At the least this is an indication of the desirability of further back-crossing of the F1 to the Gros Michel.

A small preliminary trial of cover crops under bananas was laid down on the irrigated seedling plot at Hope on May 12th. Covers used were Jerusalem Pea (*Phaseolus munjo*), Overlook Bean (*Canavalia ensiformis*), and Bengal Bean (*Stizolobium mucunoides*). Bengal Bean proved unsuitable on account of its vigorous climbing habit. Jerusalem Pea and Overlook Bean both provided good cover, but it became necessary to eradicate the former in November on account of an outbreak of Eelworm. The cover produced the desired result of conserving moisture in the upper layers of the soil and should prove a valuable device in dry areas in the summer months. During the winter, however, a continuously moist soil tends to set back growth, probably due to chilling of the young banana roots. This was particularly noticeable among the younger seedlings.

(ii) *Panama Disease Tests.*—Tests of the reaction of the seedlings to attack by *Fusarium oxysporum* Schl., (*F. cubense* E. F. Smith.), the Panama disease pathogen, have been continued: other than the four

seedlings reported in 1933 as being susceptible, all have proven immune. Tests are carried out by planting in heavily infested soil, soil in which, on account of disease, it is impossible to reap a crop of Gros Michel. During the bulking of suckers of new seedlings two suckers are planted in a small test plot at Hope, and as more suckers become available up to twenty plants are established in diseased plots at Coleraine. seedlings undergoing test at present are as follows:—

Plot.	Planted.	Immune.	Susceptible.
Coleraine	24.1.33	S. 4, 7, 13, 17, 19, 26, 27, 28, 34, 39, 40, 42, 44, 48, 72, 82, 87, 89, 94, 95, 97, 100, 105. S. 20 (highly resistant)	S. 5, 24, 29.
Hope	29.11.32	S. 27, 39, 78, 79, 87, 95, 96, 98, 103, 106, 107, 114.	
	Replanted 8.5.35	S. 85, 86, 88, 90, 91, 92, 93, 99, 108, 109, 110, 111, 116, 118.	

Immunity of S86 (S5 xS5) is noteworthy in that it is an F2 plant from a highly susceptible parent, indicating that S5 is heterozygous for the factor(s) determining immunity: S95 (GM x S5) is similarly derived from two susceptible parents.

On the 9th of August an experiment was laid down to test the report, which has been current in the country for some time, that the Highgate variety is resistant to Panama disease. 120 suckers of each of the varieties Gros Michel and Highgate were planted in heavily infested land in alternate rows, each row containing 12 plants. The plot was inspected on November 22nd. when the incidence of infection was found to be, 34.12% of the Gros Michel and 23.33% of the Highgate diseased. The experiment had then only been in progress for slightly over four months, but even after so short a time it must be concluded that if the Highgate variety should finally prove more resistant than the Gros Michel the difference will not be sufficient to be of commercial value.

5. Papaw Selection.

In an endeavour to discover a variety of papaw (*Carica papaya*) resistant to mosaic disease, collection of seed and tests were commenced in 1933. By the end of 1934, ten local, and eight foreign strains collected from Hawaii, Panama and Japan had proved completely susceptible. Two further varieties of *C. papaya* from Trinidad and Ceylon included this year also succumbed. The results of trials incomplete at the end of 1934 are tabulated below:—

Variety.		Source.	Number of Plants.	Date Planted.	Percentage of infection on 19.12.34.	11.5.35.	7.11.35.
C. papaya	M2	Jamaica	17	29.8.34	94.1	100.0	..
"	SA1	South Africa	13	10.10.34	7.7	92.3	100.0
"	Solo	Java	4	10.10.34	0	75.0	100.0
"	G1	Jamaica	5	10.10.34	0	100.0	..
"	GC	Colombia	12	10.12.34	..	33.3	100.0
"	Cy	Ceylon	1	29.8.34	0	100.0	..
"	Td.	Trinidad	10	11.5.35	..	..	100.0
C. posospora	J1	Jamaica	14	29.8.34	71.4	100.0	..
"	J2	"	7	29.8.34	71.4	85.7	100.0
"	J3	"	1	29.8.34	0	100.0	..
"	C3	Cuba	14	10.12.34	35.7	35.7	100.0
C. semianglia		Java	19	29.8.34	10.5	94.7	100.0
"		"	4	10.10.34.	0	100.0	..
C. cauliflora		Panama	20	29.8.34	0	0	0

Infection is left to natural agencies which have been so far only too effective. The final entry in the table, a wild species from the Canal Zone, appears to possess a high degree of resistance. Unfortunately this variety suffered severely from drought during the year, but a new planting being made will be used for crossing with local commercial varieties as soon as possible in an endeavour to raise a resistant commercial strain.

6. Miscellaneous.

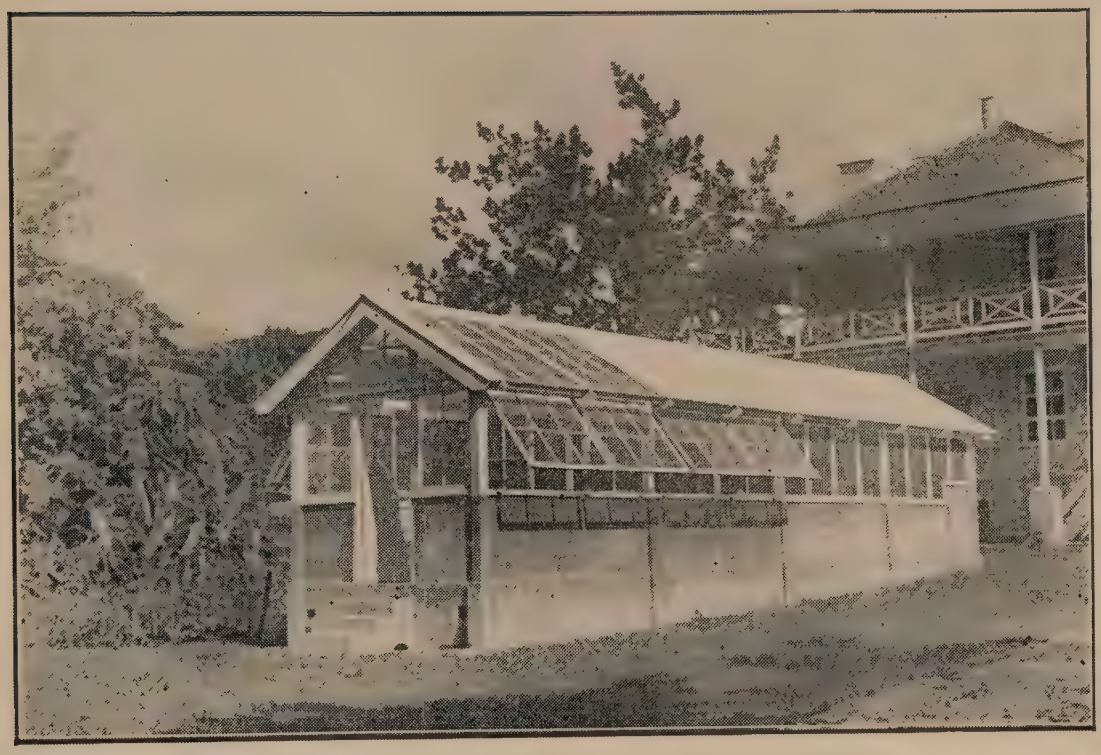
A paper entitled 'Hybridism in Musa. I. Somatic Cytology of certain Jamaican Seedlings' has been published in the Journal of Genetics Vol. 31.

The Departmental Staff Conference held at Hope on January 14th was attended.

The-All Island Agricultural Show, held at May Pen on April 22nd, was attended and an exhibit demonstrating the work of this division was arranged.

The period of five months vacation leave included eleven days study leave, from August 28th to September 7th, during which the Imperial Botanical Conference in London and the Sixth International Botanical Congress in Amsterdam were attended.

L. N. H. Larter,
Government Geneticist.
4.2.36.



Greenhouse erected at Government Laboratory, Hope, for use of Geneticist.

Interior of New Greenhouse, Government Laboratory, Hope.

D.—PUBLICATIONS.

The following Departmental publications were issued during the year:—
Annual Report of the Department of Agriculture for 1933.
Leaflet—"Citrus Planting" (Reissued).
Circular—"Modified Method for the Treatment of Panama Disease."
Bulletin No. 4 (New Series)—"A Survey of the Yields of Sugar Cane in Jamaica in the 1933-34 Crop" Report by H. H. Croucher.
Bulletin No. 5 (New Series)—"Maturity Tests for Citrus"—A Report on Laboratory Data by H. H. Croucher.
Annual Report of the Department of Agriculture for 1934.

SECTION III—FINANCIAL STATEMENTS.

A. Revenue and Expenditure as shown in Colonial Accounts for Year ended 31st March 1936.

Revenue.

	£ s. d.	£ s. d.
Head IV.—Fess of Office, etc.—		
(a) Fees of Office:—		
Government Veterinary Surgeon's Fees ..	13 1 6	
Bee Inspector's Fees	0 4 0	
Government Laboratory Fees	153 2 0	166 7 6
(c) Reimbursements-in-Aid:—		
4. Miscellaneous		
Plantation and Garden Sales ..	388 13 3	
Agricultural Students Fees	890 0 3	
Laboratory Sales	985 12 7	
Grove Place Pasturage, etc.	533 10 3	
Citrus Nurseries, Sales	655 9 4	3,453 5 8
Head VI.—Rents	..	6 0 0
Head VIII.—Miscellaneous Receipts	..	8 17 4
		£3,634 10 6

Expenditure.

Head XXXVI.—Department of Science and Agriculture.	Personal Emoluments. £ s. d.	Other Charges. £ s. d.	Total. £ s. d.
Head Office	3,583 12 4	(a)5,455 7 6	9,038 19 10
Public Gardens	903 0 3	2,782 9 4	3,685 9 7
Agricultural Experiments and Field Services	1,594 4 10	705 4 9	2,299 9 7
Diseases of Animals and Plants	5,806 2 7	3,871 10 4	9,677 12 11
Stud Farm and Experimental Station, Manchester	808 16 3	1,267 3 2	2,075 19 5
Farm School	2,207 9 0	1,303 1 9	3,510 10 9
Research and Laboratories ..	5,056 7 9	1,548 6 0	6,604 13 9
Experiment Station, Hope ..	..	654 4 11	654 4 11
Miscellaneous	..	(b)5,144 2 8	5,144 2 8
	£19,959 13 0	22,731 10 5	42,691 3 5
Head IV.—His Excellency the Governor and Staff	104 0 0	608 3 5	712 3 5
Head XXXIX.—Expenses Jamaica Banana Commission	..	2,671 14 1	2,671 14 1
Head: General Advances.			
D/A for Cold Storage Exptl. Plant	..	1,335 7 11	..
D/A for Bitter Damsel Nurseries ..	..	51 16 9	1,387 4 8
Deposit A/c John A. Roebling ..	..	4 7 9	4 7 9
	£20,063 13 0	£27,403 0 4	£47,466 13 4

N. B. Donaldson,
Accountant,
29.5.56.

(a) Includes £5,339 0s. 2d. Travelling Expenses for Extra Staff of the Department.
(b) Includes £4,379 7s. 1d. for Development of Agricultural Industries.

B. ACCOUNTS OF HOPE STOCK FARM.

Hope Stock Farm, Year Ending December 31, 1935. Cash Appropriation.

Receipts.		Approved Estmates.	Revised Estimates.	Actual.
		£	£	£ s. d.
Balance on 31.12.34		2,284	2,530	2,530 14 5
Milk Sales		4,700	5,194	5,194 6 6
Butter Sales		150	191	191 4 6
Live Stock Sales		300	182	181 13 6
Poultry Sales		40	47	46 18 6
Rents		200	222	221 15 10
Bombay Mango Sales		400	364	364 8 7½
Pine Sales		20	12	11 15 0
Miscellaneous				
Interest at Bank	£47 19 9			
General Repairs Reimbursement	4 9 5			
Truck Repairs Reimbursement	130 0 5			
Fencing Repairs Reimbursement	9 10 0			
Food for Stock	36 0 0			
Stud Fees	17 0 8			
Wages Refund	23 5 0			
Sundries	52 3 8	150	321	320 16 3
		8,244	9,063	9,063 13 1½
				£9.063 13 1½

Disbursement.		Approved Estimates.	Revised Estimates.	Actual
	£ s. d.	£	£	£ s. d.
Personal Emoluments—				
Accountant		150	150	150 0 0
Cashier		140	140	140 0 0
Farm Superintendent		50	50	50 0 0
Contribution to Pension		26	26	25 10 0
Foremen		149	149	148 15 0
Wages		1,300	1,492	1,492 10 7
Rent Commission		20	44	44 7 2
Fruit Commission		55	46	46 6 10
Clerk and Storekeeper		100	70	69 18 4
		1,990	2,167	2,167 7 11
Other Charges—				
Food for Stock				
Growing Canes	78 0 9			
Growing Guinea Corn	72 18 0			
Manufacturing Guinea Corn Silage	86 2 3			
Poultry Feeds	41 3 8			
Imported and other Feeds	1,182 10 4	1,400	1,461	1,460 15 0
Crops: Plantation Pines		12	5	4 17 7
Rearing Calves		20	1	1 3 0
Cleaning and Fencing		450	465	464 14 9
Buildings, Machinery and Equipment:—				
Buildings	992 14 3			
Machinery	27 14 6			
Furniture and Fixtures	114 19 4			
Stores and Parts	28 8 10			
Vehicles and Harness	159 7 4			
Tools and Implements	48 16 10			
General Repairs	265 5 5	1,800	1,637	1,637 6 6
Purchase of Live Stock	23 3 0			
Jamaica Government	1 18 1	500	25	25 1 1
Miscellaneous:—				
Truck	169 16 10			
Rents: Expenses	2 4 0			
B. Mangoes Expenses	46 14 6			
Butter Expenses	11 0 2			
Valuations Expenses	16 14 0			
Poultry Expenses	4 7 5			
Taxes	13 6 0			
Sundries	273 2 4	650	537	537 5 3
		6,822	6,298	6,298 1 1
Balance: In Bank of Nova Scotia	671 17 9			
In Govt. Savings Bank	2,093 4 3			
In hand to be lodged	0 0 0½			2.765 2 0½
				£9 063 13 1½

N. B. Donaldson, Accountant.

A. C. Barnes, Director of Agriculture

Hope Stock Farm, Year ended December 31, 1935.

Dr. — Profit and Loss Account. — Cr.

	£ s. d.	£ s. d. s.		£ s. d.
To Depreciation:			By Rents	175 4 8
Buildings	126 16 6		Bombay Mangoes ..	271 7 3½
Machinery	134 0 7		Milk	5,224 3 7
Furniture and Fixtures ..	81 16 8		Butter	185 19 11
Truck	30 0 0		Interest (Bank) ..	58 2 4
Tools and Implements ..	62 4 11		Stud Fees ..	17 8 0
Vehicles and Harness ..	36 10 3		Miscellaneous ..	49 3 11
Stores and Parts ..	0 5 0	471 13 11		
Repairs and Upkeep:				
Buildings	122 4 11			
Machinery	31 18 4			
Furniture and Fixtures ..	15 18 6			
Truck	4 10 2			
Tools and Implements	16 11 4			
Vehicles and Harness ..	158 0 7			
General	264 12 1	613 15 11		
Truck (running expenses) ..		41 9 9		
Food for Stock (consumed) ..		1,390 11 6		
Plantaton (Pines) ..		18 2 7		
Taxes		13 6 0		
Rearing Calves at Grove Place ..		1 18 0		
Cleaning and Fencing ..		461 9 9		
Wages		1,469 5 7		
Accountant ..		150 0 0		
Cashier		140 0 0		
Foreman		148 15 0		
Farm Superintendent ..		50 0 0		
Contribution to Pension		25 10 0		
Clerk and Storekeeper		69 18 4		
Poultry		13 4 1		
Livestock		511 16 6		
Miscellaneous Expenses		276 18 9		
Balance Net Profit for year		113 14 0½		
		£5,981 9 8½		£5,981 9 8½

N. B. Donaldson, Accountant.

A. C. Barnes, Director of Agriculture.

Hope Stock Farm Year ended December 31, 1935.

Balance Sheet.

Assets.	£	s.	d.	£	s.	d.
Buildings—						
As at 31.12.34	3,959	18	5			
Additions	870	9	4			
	4,830	7	9			
Depreciation	126	16	6	4,703	11	3
Machinery—						
As at 31.12.34	1,213	13	9			
Additions	5	12	6			
	1,219	6	3			
Depreciation	134	0	7	1,085	5	8
Furniture and Fixtures—						
As at 31.12.34	1,045	12	5			
Additions	99	0	10			
	1,144	13	3			
Depreciation	81	16	8	1,062	16	7
Truck—						
As at 31.12.34	60	0	0			
Depreciation	30	0	0	30	0	0
Tools and Implements—						
As at 31.12.34	171	10	9			
Additions	32	5	6			
	203	16	3			
Depreciation	62	4	11	141	11	4
Vehicles and Harness—						
As at 31.12.34	268	6	6			
Additions	1	6	9			
	269	13	3			
Depreciation	36	10	3	233	3	0
Stores and Parts: Stock as per Inventory				189	9	4
Food for Stock: Stock as per Inventory				817	0	1
Plantation: 1 acre Pines				25	0	0
Live Stock: Cattle and Horsekind	7,530	3	0			
Poultry	77	10	0	7,607	13	0
Accounts Receivable—						
Harold Z. Bolton	0	3	1			
L. N. H. Larter	0	14	2			
W. H. Edwards	0	14	2			
Hon. Major Hallinan	1	3	3			
W. S. Grizzle	0	8	9			
O. W. Harrison	0	5	5			
R. G. Kirkham	0	2	6			
Hon. A. C. Barnes	1	2	9			
Public Hospital	300	2	9			
Tuberculosis Hospital	24	10	0			
Jubilee Hospital	20	8	1			
O. L. Crichton	0	0	4			
Govt. Laboratory (Hope)	15	0	0			
Dr. R. Hewson	0	2	3			
E. S. Harvey	0	0	6			
Farm School	4	9	7			
Est. Dr. J. Myers	1	3	0			
Lunatic Asylum	135	18	7			
General Pententiary	7	13	11			
H. H. Croucher	1	1	8			
G. E. Redshaw	0	14	2			
J. W. Howe	0	11	10			
Dr. S. Lockett	0	13	4	517	4	1
Government Savings Bank Deposit a/c	2,093	4	3			
Bank of Nova Scotia: Current a/c	671	17	9			
Cash in hand to be lodged	0	0	0½	2,765	2	0½
				£19,177	16	4½

Liabilities.	£	s.	d.	£	s.	d.
Accounts Payable—						
H.M.A.S. Australia	0	4	9			
M. McDonald	0	0	2			
Ansley Webster	0	9	0			
Grove Place	0	15	0	1	8	11
Jamaica Government—						
Balance of Grant for setting up Live Stock	424	5	2			
Less paid off during year for balance cost of a Proof Ass supplied to Grove Place during previous year	1	18	1	422	7	1
Profit and Loss—						
As at 31.12.34	18,640	6	4			
Add Profit for the year	113	14	0½	18,754	0	4½
				£19,177	16	4½

N. B. Donaldson, Accountant.

A. C. Barnes, Director of Agriculture.

SECTION IV—LEGISLATION AFFECTING AGRICULTURAL INDUSTRIES.

A. Laws Relating to Agriculture passed during the Year 1935.

Law No.	Date Assented to.	Short Title.	Chief Provisions.
24	12th December, 1935	The Banana Industry Aid Law	To afford Assistance to the Banana Industry of the Island and to enable Loans in aid thereof when damaged by hurricane.
2	16th Dec., 1935	The Agricultural Produce Amendment Law 1935	To amend further the Agricultural Produce Law 1926 (Law 19 of 1926) in order to provide generally for more effective control over dealings in Agricultural Produce by special protection of Bananas, Citrus Fruit, Coconuts and Avocado Pears; issuing Carriers' Licences, etc.
31	14th Jan., 1936	The Citrus Development Aid Law 1935	To afford Assistance to owners of Land in establishing Citrus Orchards.

B. Orders, Rules, etc., relating to Agriculture Published during the Year 1935

Date.	Description.	Subject.
22nd Jan., 1935	Proclamation under Law 23 of 1916	Permitting the importation of fruits and vegetables from New Zealand.
27th May, 1935	Order under Law 24 of 1890	Prohibiting the importation of Fodder and/or Litter except from Great Britain, Canada, New Zealand and U.S.A. If from Great Britain source of supply and route of transportation to ship must be certified by Ministry of Agriculture and Fisheries to be in districts free from Foot and Mouth Disease.
27th May, 1935	Order under Law 24 of 1890.	Prohibiting the importation of Dung (other than the excrement of Birds) from All Countries; but dung contained in the shipping box or crate of any animal legally imported may be landed.
1st Oct., 1935	Order under Animal Contagious Diseases Laws 1890-1924	(1) Prohibiting the importation of used or second-hand Animal Blankets, Saddle Cloths, Felting, Pad, etc. except when accompanying imported animals as clothing or individual accoutrements thereof at time of importation. (2) Prohibiting the importation of used or second-hand Harness, Riding or Pack Saddles, Halters, Reins, Girths, Yokes, Ropes, Chains, or other trappings except fumigated by the port authorities with Hydrocyanic Gas when landed and before delivery to consignee. Exemption from fumigation if and when actually accompanying imported animals as their individual accoutrements or fittings.

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